DOCUMENT RESUME

ED 320 484 HE 023 567

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|---|---|
| AUTHOR | Winkler, Donald R. |
| TITLE | Higher Education in Latin America. Issues of Efficiency and Equity. World Bank Discussion Papers 77. |
| INSTITUTION | World Bank, Washington, D. C. |
| REPORT NO | ISBN-0-8213-1518-8 |
| PUB DATE | 90 |
| NOTE | 170p. |
| AVAILABLE FROM | The World Bank, 1818 H Street, NW, Washington, DC 20433 ($10.95). |
| PUB TYPE | Collected Works - General (020) |
| EDRS PRICE | MF01 Plus Postage. PC Not Available from EDRS. |
| DESCRIPTORS | *Cost Effectiveness; Educational Policy; Efficiency; Enrollment; *Equal Education; *Financial Support; Foreign Countries; Government School Relationship; *Higher Education; Latin Americans; Private Colleges; Public Colleges; *Public Education; *Resource Allocation |
| IDENTIFIERS | *Latin America |

ABSTRACT

The current state of higher education in Latin America is examined in discussion papers which attempt to identify the major problems in efficiency, finance, and equity in the area and offer policy choices for improving university performance and quality while maximizing society's return on its investment. The papers are organized as follows: (1) the institutional context which provides the boundaries for analysis and public policy debate; (2) efficiency in resource allocation within the higher education sector; (3) efficiency in resource allocation between higher education and other sectors; (4) equity in the distribution of access to and government subventions to higher education; (5) sources of finance for higher education (sections 2 through 5 focus on undergraduate instruction primarily in larger countries in Latin America); (6) issues in graduate education and research; and (7) a discussion of prescriptions for the improvement of equity and efficiency in Latin American higher education. Appendices include country-by-country breakdown of enrollments, higher education expenditures, and other statistics related to higher education that are indicative of specific countries. Contains 145 references. (GLR)

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World Bank Discussion Papers

# Higher Education in Latin America

## Issues of Efficiency and Equity

Donald R. Winkler

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# Higher Education in Latin America

## Issues of Efficiency and Equity

Donald R. Winkler

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Washington, D.C.

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First printing March 1990

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ISSN 0259-210X

**Library of Congress Cataloging-in-Publication Data**

Winkler, Donald R.
Higher education in Latin America : issues of efficiency and equity / Donald R. Winkler.
p. cm. -- (World Bank discussion papers ; 77)
Includes bibliographical references.
ISBN 0-8213-1518-8
1. Education, Higher--Latin America. 2. Educational equalization--Latin America. 3. Higher education and state--Latin America.
I. Title. II. Series.
LA543.W56 1990
378.8--dc20 90-34254
CIP

## Abstract

Enrollments in Latin American universities increased tenfold between 1960 and 1985, resulting in higher education opportunities equivalent to many industrialized countries. Government spending, however, did not increase commensurately with enrollment demand, leading to lower quality instruction in public universities and dramatic growth in private higher education. Private institutions now account for one-third of total enrollments in Latin America. This heterogeneity in Latin American higher education makes it difficult to draw conclusions regarding efficiency and equity which apply to all institutions and all countries.

Resource allocation in the public university in Latin America is frequently inefficient. Teacher salaries are too low to attract scholars dedicated full-time to instruction and research, and professors usually lack the supplies and equipment required to carry out their work. At the same time, administrative budgets and the administrative support staff are excessively large. Improvements in internal efficiency will require the introduction of modern management information systems on student and resource flows and the introduction of performance criteria in allocating resources within higher education.

Increased higher education enrollments over the past two decades have been accompanied by reduced instructional quality in many countries. At the same time, the private and social returns to higher education have declined, and unemployment rates have increased for college graduates. External efficiency could be raised through improvements in the quality of instruction, by providing students with the earning data required to make informed career choices, and by introducing greater flexibility in the curriculum to permit students more time to decide on their fields of specialization.

Although higher education opportunities have increased greatly over the past two decades, the benefits of higher education primarily accrue to children from higher income backgrounds. Children from low income backgrounds lack the academic preparation to either gain entrance to or successfully compete in the public university. Low income secondary school graduates may fail to enroll in universities at all, or they attend private institutions, which frequently have lower entrance standards than the public university. The results are that low income students are often more likely than high income students to pay for their education, and government-financed higher education subsidies are heavily skewed in favor of higher income families. Equity in higher education can be improved by increasing access by low income groups, primarily through better primary and secondary schooling, and by raising subventions to low income students through higher financial aid and reducing subventions to high income students.

Constraints on the government budget for higher education argue for greater efficiency in the use of that budget. Increasingly,

governments should consider policies to provide loans to needy students attending private universities or to ensure access by private universities to capital markets to finance the capital investments required for expansion. Cost-recovery can be increased in public institutions by eliminating subsidies for non-instructional services and raising tuition rates while simultaneously introducing loan and scholarship programs to improve access by lower income students. The public higher education budgeting process can be altered to include performance incentives for improvements in internal efficiency.

Generalizations about higher education in Latin America ignore the many success stories found in both public and private universities. These include innovations to reduce instructional costs, increase cost recovery, and use performance criteria in resource allocation. These success stories can be used as models to improve efficiency and equity.

## Acknowledgments

The data for this study were prepared with joint financing from three divisions (LATHR, PHREE, EDIHR) of the World Bank but does not necessarily reflect the views of the Bank. The author gratefully acknowledges the contributions of Douglas Keare in initiating and guiding the evolution of this study. The paper has, also, benefited greatly from earlier contributions on the subject written by Robert Drysdale, Ralph Harbison, Claudio de Moura Castro, Augusto Franco, and Ernesto Schiefelbein. Numerous individuals commented on earlier drafts of the paper; sincere thanks are extended to Stephen Hoenack, Elizabeth King, Bernardo Kugler, Daniel Levy, Peter Moock, and George Psacharapolous.

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## EXECUTIVE SUMMARY

Higher education enrollments in Latin America increased tenfold between 1960 and 1985, resulting in levels of access approaching those found in many industrialized countries. Private institutions absorbed more than their share of this growth and now represent one-third of total enrollments in the region.

Government spending has not kept pace with growth in enrollments in recent years. Higher education came to absorb a larger share of a smaller pie, as the total education share of government spending has declined. The net result has been large reductions in real public higher education expenditures per pupil since 1980. These reductions have, in turn, resulted in lower faculty salaries, smaller outlays on supplies and equipment, and perceived losses in the quality of instruction and research. Public policy should be more concerned with improving quality than quantity or access in the near future.

Generalization regarding the problems and policy options in Latin American higher education is difficult due to the wide variety of systems and institutions. In terms of enrollments, some systems are predominantly public, some predominantly private, and one is mixed. A wide variety of institutions exist in the region, often within a single country. There are very large public universities with open admission policies, public and private comprehensive research universities, smaller specialized institutions, and emerging institutions including open universities and large numbers of new private institutions which have arisen in response to growing demand for higher education. Public and private institutions generate similar kinds of the social benefits used to justify public subventions to higher education, but public policy and public funding largely ignores the private sector.

Internal efficiency. Resource allocation within the Latin American public university is inefficient. The ratio of students to faculty, administrators, and staff is low relative to systems in other countries; inadequate funds are allocated to non-personnel categories of expenditure; faculty salaries and teaching loads are low by international standards. At the same time, instructional quality is perceived as being low. Efficiency could be improved by increasing student-teacher ratios, decreasing the size of administrative staff per student, increasing intensity of use of capital facilities and using the cost savings to improve quality by increasing faculty quality (by raising the proportion of full-time faculty and increasing their salaries) and increasing outlays on supplies and equipment.

Improvements in internal efficiency will require introduction of management information systems on student and resource flows to permit assessment of costs and productivity; require introduction of performance criteria in the allocation of resources among units within the university; require establishment of mechanisms to evaluate program performance; and require training of university administrators in the use of these tools.

Significant constraints to improving efficiency include a system of governance which often substitutes political for performance criteria; emphasis on university autonomy which rejects policy directives from government (and sometimes university administration as well); lack of a tradition of careers in university administration; and a lack of norms on efficiency measures.

External efficiency. Several indicators suggest increasing the supply of labor completing higher education should receive lower priority today than in the past. Unemployment rates for college- educated labor have increased both absolutely and relative to the overall unemployment rate in recent years; the social rate of return to higher education appears to have declined since 1980; and rates of return to other levels of education continue to exceed those for higher education. There is no evidence on the rate of return to improvements in instructional quality in higher education, but a plausible hypothesis is that it would exceed that to expansion of quantity.

Social rates of return vary considerably by field of study, suggesting external efficiency could be improved through changes in the instructional mix. These changes might come about by influencing student demand through tracer studies and other information on earnings and employment opportunities by field. Greater flexibility in curriculum, permitting students more time to decide on their fields, might also help the speed of response to changing labor market conditions. Finally, incentives might be provided via financing formulae to induce universities to improve their course offerings in accordance with social rates of return.

Equity. Although access to higher education has improved generally over the past two decades, there remain large differences between income groups. The causes for low access by low income children are several, including inadequate preparation at the primary and secondary levels and lack of financing for the private costs of higher education. Aside from equity concerns, the failure to provide access to well-qualified lower income children can adversely affect economic productivity. Differences in access by income group to public higher education is reflected in differences in government subventions. Contrary to popular belief, subsidized public higher education actually benefits higher income groups more than lower income groups.

Several public policies can be adopted to increase access by low income groups and improve the distribution of public higher education subventions, including providing financial aid to lower income students, improving academic preparation at the primary and secondary levels, income-contingent pricing of higher education, and adapting teaching schedules to facilitate attendance by working students.

Finance. The social benefits of higher education strongly argue for government finance of basic research and research-related graduate education, but the private benefits of undergraduate and professional instruction are often large enough that public subsidies can be small. In aggregate the private share of higher education expenditures is already large due to the high proportion of enrollments in private institutions, but students in public institutions both pay very low tuition and receive subsidized non-instructional services.

Given that real government outlays on higher education are unlikely to increase significantly in the near future and given continued enrollment growth, the private share of higher education finance will continue to grow, either by growth of the private sector or cost-recovery in the public sector. Growth of the private sector could be stimulated by loan programs to finance tuition payments or by providing access to the capital markets to finance the capital investment required for expansion. Cost-recovery in public institutions can be increased by eliminating subsidies for non-instructional services and by raising tuition rates while simultaneously introducing loan and scholarship programs to guarantee improved access by lower income students.

Governments allocate funds to universities via a budgeting process which has implicit behavioral incentives. Efficiency in the allocation of funds among universities could be improved by introducing explicit behavioral incentives in the form of performance criteria. These incentives might include matching grants or rewards for improvements in internal efficiency. To some extent, the introduction of performance criteria in the allocation of government funds is in conflict with university autonomy, but councils of rectors or similar university associations might play the same role as government in allocating funds.

Graduate and Research Education. Research in Latin America is highly concentrated in Argentina, Brazil, Mexico, and Venezuela. Overall, the Latin American effort in R & D exceeds that of other developing countries in terms of research personnel but not in terms of research expenditures. Only 0.49 percent of GNP in Latin America is spent on research, compared with 2.23 percent in the industrialized countries. Universities employ a high proportion of available researchers in each country but receive a share of R & D funding incommensurate with their research capability.

Government support of research consists of both institutional support and project funding. Most institutional support takes the form of reduced teaching loads for professors. In spite of this support, actual research productivity in the university is low. Research resources should be reallocated in higher education, both between researchers and between institutions, in accordance with performance criteria. The social benefits of graduate education and research argue for equal treatment by government of public and private institutions.

Strategies for Improving Efficiency and Equity. While there are problems of efficiency and equity in Latin American higher education, there are, also, many success stories. These include innovative attempts to reduce the costs of instruction, increases in cost recovery, peer-based program evaluation, use of performance criteria in resource allocation, policies which treat public and private institutions equally, and regional technical assistance to improve quality and administrative efficiency. Successful examples can be used as models to improve efficiency and equity.

## I. INTRODUCTION

In the twenty-five year period 1960-1985, higher education enrollments in Latin America increased by a factor of ten. Every large country in the region dramatically increased government outlays on higher education. The role of higher education was transformed over time from preparation of a political and technical elite to education for the masses. This evolution in societal expectations regarding the role of and access to higher education has shaped public policy debates in the region on the proper role of government in financing and providing higher education.

Higher education plays an important positive role in economic development of the region. It provides the labor skills required for industrializing economies, generates the new knowledge required for successful technological adaptation and innovation, and can facilitate social mobility. On the other hand, it can also adversely affect growth by absorbing resources which could yield higher social benefits in alternative investments or by producing output of insufficient quality given the resources used.

Rapid growth in higher education--as measured in enrollments, number of institutions, expenditures, or government funding--has had important consequences for the distribution of labor market skills, the allocation of resources within the sector, sources of finance, equity in terms of access to higher education and the distribution of government subventions. This paper explores the current state of higher education in Latin America; attempts to identify the major problems in efficiency, finance, and equity in the sector; and offers policy choices for improving university performance and quality while maximizing society's return on this very sizeable investment.

This paper is a study in the economics of Latin American higher education and, thus, is organized in the following sections: (i) the institutional context which provides the boundaries for analysis and public policy debate; (ii) efficiency in resource allocation within the higher education sector; (iii) efficiency in resource allocation between higher education and other sectors; (iv) equity in the distribution of access to and government subventions to higher education and (v) sources of finance for higher education. Sections two through five focus on undergraduate instruction, with an emphasis on university education in the larger countries of Latin America; non-university education and smaller countries are the focus of less attention solely due to the resource limits of the study itself. Section six of the paper is a description of research and graduate education in Latin America with analysis of efficiency and finance issues in that subsector. Finally, Section seven concludes the paper with a discussion of prescriptions for the improvement of equity and efficiency in Latin American higher education.

The analysis contained here requires some important caveats. First, in attempting to generalize the analysis across countries, institutional variations relevant to that analysis sometimes receive insufficient attention. The analyses and recommendations contained herein are meant as general guidelines for public policy rather than institution-specific prescriptions. Second, this paper emphasizes the economic role higher education plays in industrializing economies. Higher education, also, has important cultural and political roles which are not easily analyzed using the economic model and for that reason receive little attention in this paper. Third, the quality of this paper is in part limited by available resource materials, most seriously affecting analysis of internal efficiency. The small supply of internal efficiency studies at either the institutional or sectoral level and inadequate data bases to carry out such studies limit this paper's analysis and findings on intra-sectoral resource allocation.

## A. Background

Higher education has a long and distinguished history in Latin America, particularly in the countries of Hispanic origin.[1] The first university, the University of Santo Tomas de Aquino in Santo Domingo, was authorized by Pope Paul III in 1538, although the first university to open was Mexico's Royal and Pontifical University in 1553. The colonial universities were essentially aristocratic and confessional in design and function, a model which continued into the republican period. The organization and content of higher education remained relatively stable until the mid-nineteenth century when numerous changes, largely shaped by parallel changes in Europe, brought new concepts and courses of study in fields like medicine, engineering, science, and agriculture. Higher education became a key component in the array of elite social and economic institutions built up in the nineteenth century.

With expansion of enrollments and broadening of its social base, universities gradually became centers for political debate. Political theorists and politicians came to fight within, over, and for control of the universities. The Cordoba reform movement of 1918 included students in this competition. Their political ambition soon resulted, with considerable success, in pressure for direct student participation in university governance. To the present, campus politics has tended to polarize the academic and university communities with the result that many universities have suffered from long periods of interruption of service, frequent intervention by forces external to the institution, and conflict with the public authorities. The highly politicized nature of the Latin American university is an important constraint to changes in public higher education policy.

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1/ Brazil is an exception, with the first full university organized only in the 1930's; in Brazil higher education is largely a creation of the nineteenth century.

Table I.1

Higher Education Enrollments in Latin America
(in thousands)

| | 1950 | 1960 | 1970 | 1980 | 1985 | 2000 |
|---|---|---|---|---|---|---|
| Higher Education Enrollment | 279 | 567 | 1,640 | 4,852 | 6,416 | |
| High Estimate | | | | | | 9,692 |
| Low Estimate | | | | | | 8,006 |
| Percent in Private Institutions | | 15.4 | 29.6 | 34.4 | | |
| 20-24 Year Old Population | | 17,933 | 24,034 | 33,705 | 39,173 | 48,878 |
| Higher Education Enrollment as Percent of 20-24 Population | | 3.16 | 6.82 | 14.40 | 16.38 | |
| High Estimate | | | | | | 19.83 |
| Low Estimate | | | | | | 16.38 |

Note: The low estimate assumes a constant percentage of the age group enrolls in higher education; the high estimate assumes a constant ratio of higher education to secondary education enrollments over time and an increase in the secondary education enrollment rate (relative to the age group) of 1.5 percent per year.

Sources: Unesco Statistical Yearbook 1987; 1972. Population projection for year 2000 from World Bank's World Population Projections.

## B. Recent Trends

The second half of the twentieth century has seen major change in the scale and scope of higher education. As seen in Table I.1, enrollments tripled in the decade 1960 - 1970 and tripled again between 1970 and 1980. Enrollment growth is reflected in improved access. The proportion of the relevant age group enrolled in higher education quadrupled in the two decades 1960 - 1980. Access in Latin America is now considerably higher than that found in other developing regions. Table I.2 demonstrates an enrollment ratio for Latin America that is ten times that in Anglophone Africa and more than double the ratio for South Asia. Growth in the supply of higher education has resulted in a high level of access to higher education in Latin America.

Table I.2

Enrollment Ratios, Latin America and
Other Major World Regions
(Percent of school-age population)

| Region | Primary | Secondary | Higher |
|---|---|---|---|
| Anglophone Africa | 77 | 17 | 1.2 |
| Francophone Africa | 46 | 14 | 2.4 |
| South Asia | 71 | 19 | 4.4 |
| East Asia and Pacific | 87 | 43 | 9.1 |
| Latin America | 90 | 44 | 12.0 |
| Middle East and North Africa | 82 | 36 | 9.4 |
| Developing Countries | 75 | 23 | 6.9 |
| Developed Countries | 100 | 80 | 21.0 |

Source: Mingat and Tan (1986).

Since much of the growth in higher education enrollments has occurred in publicly-funded institutions, government expenditures on higher education have also increased. In 1980, 23.5% of government spending on education went to higher education, an increase from 15.9% just one decade earlier (Table I.3). Furthermore, this increase in higher education's share of education spending came at a time when all of education's share of the total government budget was declining, from 18.9% in 1970 to 15.3% in 1980 (Table I.4). Relative to either developing countries or developed countries as a whole, Latin America spends a higher share of the government budget on education and a higher share of the education budget on higher education. Quite clearly, higher education has been given high budget priority by Latin American governments.

## Table I.3

## Allocation of Public Recurrent Expenditure on Education by Level, 1965 - 1980 (percentages)

| Region and Level of Education | 1965 | 1970 | 1975 | 1980 |
|---|---|---|---|---|
| Latin America | | | | |
| Primary | 62.4 | 57.4 | 51.6 | 50.9 |
| Secondary | 23.3 | 26.7 | 25.0 | 25.6 |
| Higher | 14.3 | 15.9 | 23.4 | 23.5 |
| Developed Countries | | | | |
| Primary | 44.7 | 39.7 | 38.0 | 36.6 |
| Secondary | 41.4 | 41.7 | 42.6 | 44.3 |
| Higher | 13.9 | 18.6 | 19.4 | 19.1 |

Source: World Bank (1986a).

## Table I.4

## Public Spending on Education as Share of Government Budget, 1965 - 1980 (recurrent plus capital expenditures)

| Region | 1965 | 1970 | 1975 | 1980 |
|---|---|---|---|---|
| Latin America | 18.7 | 18.9 | 16.5 | 15.3 |
| Developing Countries | 16.1 | 15.8 | 14.5 | 14.7 |
| Developed Countries | 16.0 | 15.5 | 14.1 | 13.7 |

Note: Mean percentages were calculated only for countries with data for all four periods.

Source: World Bank (1986a).

## Decade of the 1980's

The 1980's have been less kind to higher education than the previous two decades. As shown in Table I.1, growth in enrollments and improvement in access have moderated since 1980. However, in response to severe economic recession and declining government revenues, public spending on higher education in many countries decreased considerably between 1980 and 1985, especially in per student terms. Table I.5 shows the results for four countries. Per student spending in Brazilian federal universities, for example, declined by almost half (48.6%), and spending in Mexican higher education declined by about one-third (29.9%). Decreased spending was reflected in lower faculty pay.[2]

Table I.5

Index of Total Budgets and Budget Per Student Ratios in Public Higher Education for Selected Countries

| | Budget in Constant Prices | | | Budget per Student | | |
|---|---|---|---|---|---|---|
| Country | 1970 | 1980 | 1985 | 1970 | 1980 | 1985 |
| Argentina | 100 | 53 | 54 | 100 | 32 | 17 |
| Brazil (Federal only) | 100 | 278 | 147 | 100 | 170 | 87 |
| Mexico | 100 | 884 | 811 | 100 | 244 | 171 |
| Chile | 100 | 152 | 88 | 100 | 86 | 34 |
| Venezuela | 100 | 342 | 339 | 100 | 114 | 82 |

Sources: IMF, Government Financial Statistics
Unesco, Statistical Yearbook
Brazil, Ministerio da Educaçao (1986)

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[2] Annex II.3 shows that for Argentina real faculty pay declined by almost two-thirds between 1980 and 1985.

Economic recession not only reduced government spending on higher education, mostly in public institutions, it also decreased demand by students for private higher education. As a result, the private share of total higher education enrollments has decreased or its growth has moderated at least for those countries for which data is available.[3]

## C. Typology of Institutions and Systems

### Institutions

Latin American higher education is not only distinguished by a high degree of access but also by a diversified set of institutions among which students can choose. Qualified students are often able to choose among large, comprehensive public universities, somewhat smaller comprehensive private universities, smaller public and private institutions, and newer, emerging institutions.

Large, comprehensive public universities often had their origin as the traditional institution for preparation of the country's political and technical elite. When social demand for higher education expanded, many of these institutions were allowed to grow, resulting in large enrollments. San Marcos University in Lima, for example, had enrollments (in 1983) of almost 44,000, the Central University of Venezuela (UCV) had more than 52,000 students in 1982, and the University of Sao Paulo had over 49,000 students in 1986. The introduction of open admissions policies in some countries subsequently resulted in gargantuan versions of these institutions. UNAM in Mexico, for example, has an enrollment of 300,000 (including enrollments in UNAM-affiliated secondary education) and received (in 1983) 27% of total federal higher education spending. The University of Buenos Aires enrolled about 250,000 students in 1986, an increase from 90,000 in 1983.

The comprehensive public university is often the flagship institution of the country offering a wide variety of undergraduate and graduate fields of study. Its special status puts it in a category separate from all other universities when budget allocations are determined.

The comprehensive private university is usually confessional and smaller than the public university. The Catholic university of Lima, for example, had about 8,200 students in 1983, and the Andres Bello Catholic University in Caracas had 8,300 students in 1982. There are some important exceptions to the religious nature of the comprehensive private university, e.g., University of Los Andes in Bogota, and the Monterrey Institute of Higher Technical Studies in Mexico.

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3/ For example, the private share in Brazil declined from 64.3% to 59.3%, and in Argentina from 21.7% to 16.5%, between 1979/80 and 1985.

The smaller public and private institutions embrace a broad array of activities, although they are primarily undergraduate in nature; they are often highly specialized. They range from normal schools for the preparation of teachers to technical institutes with distinguished reputations, e.g., Brazil's Aeronautical Technological Institute, which does the best job of training aeronautical engineers in the country, or Peru's National Agrarian University. Some of the smaller private institutions are oriented towards educating children from higher income homes (e.g., MacKenzie University in Sao Paulo), and some of the public institutions are strongly oriented towards the community (e.g., the network of municipal colleges in Santa Catarina, Brazil (ACAFE)).[4]

Finally, there are the newly emerging institutions, most of which are either nontraditional or private, in Latin America. There are, for example, open universities in Colombia (e.g., UNISUR with over 7,000 students) and Venezuela (UNA with over 12,000 students).[5] In addition, there are the new private institutions which have arisen throughout Latin America, many of which have a reputation for low quality instruction but some of which have improved and expanded rapidly (e.g., Faculdades Objetivo in Sao Paulo). These institutions emphasize the provision of low-cost university instruction, as is seen from the distribution of majors given in Table I.6: relative to public institutions, private institutions tend to offer less in the way of engineering and medicine and more openings in law and management, which tend to be less expensive areas of instruction to finance due to their lower physical plant requirements. The new private institutions are only loosely regulated and almost never evaluated. As a result, very little is known about their quality.[6] In some countries, however, they have played a very important role in extending access to higher education.

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4/ ACAFE is a nonprofit coordinating body with campuses in eighteen communities around the Brazilian state of Santa Catarina. One campus is the University for the Development of Santa Catarina State (UDESC) while the other seventeen are municipal institutions; the latter often receive most their revenues from tuition.

5/ Arias Ramirez, et.al (1985), and Barrios (1986); see Batista (1985) for an analysis of the open university for Brazil.

6/ The private institutions are primarily regulated in terms of tuition levels not quality of instruction. Accreditation procedures are not very rigorous, and institutions are in most countries infrequently subjected to reaccreditation evaluations.

## TABLE I.6

### Distribution of Enrollments by Field of Study, Public and Private Institutions (percentage)

| Country | Business and Administration |  | Engineering |  | Law |  | Medicine |  | Exact Sciences |  |
|---|---|---|---|---|---|---|---|---|---|---|
|  | Public | Private | Public | Private | Public | Private | Public | Private | Public | Private |
| Mexico (1978) | 16.0 | 34.0 | 28.6 | 3.3 | 9.4 | 6.9 | 21.0 | 25.5 | 4.0 | 1.5 |
| Colombia (1977) | 7.1 | 24.9 | 25.5 | 16.9 | 4.1 | 15.6 | 9.4 | 4.4 | 12.1 | 3.9 |
| Ecuador (1977) | 12.6 | 18.0 | 16.6 | 7.6 | 5.7 | 6.2 | 11.4 | 1.5 | 5.3 | 2.7 |
| Peru (1977) | 16.5 | 30.5 | 28.0 | 8.2 | 3.8 | 5.0 | 7.0 | 1.4 | 3.9 | 6.3 |

Source: Adapted from Levy (1986).

Note: Figures represent percentage of total students in public and private institutions, respectively.

## Systems

The structure of the higher education system varies by country, with the principal discriminating factor being the size of the private sector. As shown in Table I.7, the private share of total higher education enrollments more than doubled between 1960 and 1980 resulting in more than one-third of total Latin American enrollments, and 63% of Brazilian enrollments in private institutions.

Table I.7

The Private Share in latin American Higher Education
(percentage)

| Region/Country | 1960 | 1970 | 1980 | 1985* |
|---|---|---|---|---|
| Total Latin America | 15.4 | 29.6 | 34.4 | 35.2 |
| Brazil | 44.0 | 55.0 | 64.3 | 59.3 |
| Total Spanish America (excluding Brazil) | 9.2 | 19.6 | 23.0 | 24.1 |

* Estimated on the basis of available data for Argentina, Brazil, Colombia, Mexico, Peru, and Venezuela.

Source: Adapted from Levy (1986), Table 1.1; Brazil, Ministerio da Educaçao, (1986); UNESCO, Statistical Yearbook, various years.

Three distinct types of higher education systems can be identified in Latin America: (i) public dominance, (ii) private dominance, and (iii) shared dominance.[7] The public sector is dominant in almost all countries in Latin America; public dominance originates with public policy to attempt to meet the social demand for higher education by expanding enrollments in public institutions, even if there are insufficient resources to maintain quality levels. Public dominance takes its most extreme form in Cuba and Uruguay; in these countries there are no private institutions. However, there are a number of other countries (e.g., Argentina, Bolivia, Ecuador) where the private sector plays a distinctly secondary role to the public sector, especially in terms of numbers of students. In other countries (e.g., Mexico, Peru), the public sector is clearly dominant in terms of enrollments, but private higher education has developed partly in response to problems of politics and quality in the public sector; here private institutions have a disproportionate share of high quality instructional programs.

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7/ This typology is adapted from Geiger (1986).

In only two countries (Brazil, Colombia) is the private sector dominant in terms of enrollments. The failure of public institutions to expand as rapidly as demand in these countries provided an opportunity for the development of new private institutions. They arose less as a result of public policy to stimulate the supply of private higher education than a consequence of policy not to tradeoff expanded enrollments for lower quality in the public sector.[8] As a result, the public institutions of Brazil and Colombia remain the most prestigious in those countries. High quality private institutions exist there, but private institutions have a disproportionate share of low quality instructional programs.

Finally, one country, Chile, exhibits shared dominance between the public and private sectors. Excepting newly created private institutions, public funding goes to either public or private institutions in three forms: (i) direct institutional support, (ii) indirect support in the form of financial aid to students, and (iii) support in the form of performance incentives to enroll higher proportions of the most highly qualified students.

This discussion of higher education institutions in Latin America provides the background for analysis of efficiency and equity issues. Each institutional type has its own peculiar problems, especially in finance and internal efficiency, but to the extent possible the analyses are generalized across institutional types. When large differences in problems are discussed--between public and private institutions, for example--they are discussed separately.

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8/ Brazil and Colombia, also, established the largest student loan programs in Latin America, thereby providing indirect financial support to private institutions.

# II. INTERNAL EFFICIENCY

## A. Introduction

Government is said to be efficient when resources are allocated so as to maximize society's welfare. Higher education, too, is said to be efficient when resources cannot be reallocated, either from higher education to other sectors or within higher education itself, so as to increase social welfare. The study of efficiency in the sense of the proper amount of society's resources to expend on higher education activities and the appropriate higher education output mix, especially the distribution of skilled labor, resulting from those activities is usually called external efficiency and is the subject of Section III in this paper.

The study of efficiency in the sense of maximizing the output of higher education given the resources it receives is labeled internal efficiency. The study of internal efficiency in turn has two separate but related aspects. Intra-sectoral efficiency considers decisionmaking at the sectoral or system level and the allocation of resources among the various institutions within the sector. Government, for example, makes decisions as to how to allocate the public budget. It has to decide whether to establish and finance public institutions, and whether to subsidize private institutions directly, indirectly, or through some combination of the two. It also has to select criteria to employ in allocating the public higher education budget. Some of these aspects of intra-sectoral efficiency are discussed in this section, while others, especially the efficiency implications of budgeting practices, are discussed in Section IV, which describes and analyzes higher education finance in Latin America.

The second aspect of internal efficiency, which is the major focus of this section, is intra-institutional efficiency, which considers decisionmaking at the institutional level and the allocation of resources within the institution. Clearly, intra- institutional and intra-sectoral efficiency are closely linked, and no attempt is made here to separate them artificially. Ministries of education, for example, often set faculty pay scales and determine the overall distribution of the budget between personnel and non-personnel resource categories. These decisions, while made outside the higher education institution itself, clearly affect intra-institutional efficiency.

### Major Problems

Cost-effectiveness as reflected in the average cost per unit of output of given quality is the commonly used measure of internal efficiency. Cost-effectiveness in higher education is in principle difficult to determine because universities are organizations which produce a variety of outputs, some of which (e.g., research and graduate education) are jointly produced. Determining cost-effectiveness in Latin American higher education is more difficult still due to limited information on unit costs and almost no measures of output quality. Still, it is possible to identify major problems which bring about either excessive costs or inadequate quality in undergraduate education.

At the intra-sectoral level, the following problems can be identified:

1. Public resources for higher education are not allocated to maximize cost-effectiveness. Neither performance nor cost criteria are typically used in allocating public funds either among public institutions or between public and private institutions.

2. Public policy by and large fails to consider the entire higher education sector in resource allocation decisions. Although private institutions generate many of the same social benefits as public ones, they are frequently ignored in public policy decisions.

3. Universities are not organized to do internal planning and provide planning data to the Ministry. In addition, the higher education secretariats in Ministries of Education frequently lack the authority and capacity to do systemwide planning.

The rector of the Universidad Nacional Autonoma de Mexico (UNAM) has identified the major intra-institutional problems of that institution, most of which apply more generally to large public institutions in Latin America (Carpizo, 1985):

1. Objective criteria are not employed in allocating resources within universities. Often, there is no relationship between staffing patterns and student demand by field.

2. Planning and evaluation are not done at the School or Faculty level and are not integrated with decisionmaking. Planning and evaluation presume, of course, the existence of an up-to-date data base on student flows, course patterns, etc.

3. Academic standards are often sacrificed to political ideals. Politicians and students alike often use the university for political purposes.

4. Admissions systems are inefficient. An open admissions policy works to the disadvantage of the well-qualified.

5. Few entering undergraduates complete their studies. Dropout and repetition rates are very high, especially in universities having open admissions policies.

6. Academic personnel have low productivity. Absenteeism among academic personnel is high, preparation is inadequate, and supervision is often lacking.

7. Faculty devote insufficient time and effort to their university duties. Faculty salaries are low and performance evaluation typically lacking, thereby providing incentives to take second jobs and ignore university duties.

8. Both faculty and administrative staffing patterns are often excessively high. Faculty autonomy can result in lack of control over the faculty payroll.

In addition, there exist problems peculiar to private institutions:

1. Instructional quality is perceived to be low. The emphasis students put on receiving credentials gives little incentive to institutions to provide high quality instruction.

2. Faculty effort is often low. The low proportion of full-time faculty in private institutions deters further development of those institutions.

## Governance

Governance is the institutional framework for setting priorities, making policy decisions, and allocating resources. The system of governance in Latin American higher education is a serious constraint to improving internal efficiency. Its highly political nature influences university objectives and resource allocation. Furthermore, the degree of political support for existing governance systems suggests major changes are unlikely. Hence, the challenge to policymakers is development of strategies to improve efficiency within the existing governance structure.

There are several actors in public higher education governance in Latin America: the government(s) providing funding, inter-university councils, the university administration, the university council, schools or departments within the university, individual faculty, and students. Relative to the important role it plays in resource allocation in Europe, government plays a minor role in the governance of Latin American higher education. In Mexico, for example, Levy (1985) argues the university has prevailed over the government in setting higher education policies and budgets. Military regimes have frequently been more interventionist than democratic governments, but even the military has paid a degree of respect to the principle of university autonomy.

The weakness of government in dealing with public universities has led to the introduction of inter-university councils, primarily composed of rectors. Some councils (e.g., Colombia, Ecuador, Peru) include representatives of both public and private institutions whereas some (e.g., Argentina, Mexico) have separate councils for public and private institutions. As government has little power to do higher education planning, these councils were developed to identify problems, develop policies, and make policy recommendations. These coordinating bodies have improved statistical information systems on higher education and provided technical assistance for improving internal university operations, but they have not succeeded in providing integrated planning for the development of higher education. For example, in Mexico the voluntary Association of Universities (ANUIES) has not been very effective due to opposition to government participation in the organization, despite the fact that coordinated planning cannot occur without the participation of the dominant source of funds.

University administrators have more power relative to the government than is true in Europe but less than in most of U.S. public higher education. The fact that university rectors are frequently elected by the university community means they are often more responsive to internal political pressures than they are to external pressures or to objectives of academic quality. Frequent changes in rectors, as a result of the political nature of the office, undermine the authority of the rector as well as the capacity for university planning.[9]

The university council typically consists of elected representatives from among the faculty, staff and students. The council is the chief legislative body of the university, with the active participation of students. In Mexico, students represent from 25 to 50% of the membership of the council. In Peru students have the right to one-third of seats on all public university governing bodies, which have purview over the entire range of academic issues: faculty hiring and promotion, curricular changes, allocation of university economic resources, and research emphases to be followed.[10] In Brazil the situation is mixed, with the voting power of students varying by university; students have little in the major research university, the University of Sao Paulo.

Although it varies by country, decisionmaking within universities is often quite decentralized with the school or faculty wielding considerable power.[11] Taken to the extreme, the central administration lacks the ability to control the faculty payroll. For example, at UNAM, schools may add faculty without the consent of the central administration. The result in recent years has been faculty inflation.[12]

Until recently, an individual faculty member in the role of catedratico (chair) wielded considerable power, equivalent to that of a department chair. In most countries (notably not including Argentina) the catedratico system has been replaced or merged with modern academic departments. Given the voting power of staff and students in many universities, the influence of faculty on university policy and resource allocation is low relative to other countries.

Finally, the role of students in university policymaking and resource allocation is a unique (relative to other regions) and powerful one, both indirectly via the right to participate in electing the rector and directly via the right to participate in the university council.

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[9] A survey of 28 universities in Mexico found only eight had the same rector in 1976 as 1972, and ten had two changes (Levy, 1985, p. 58).

[10] Thus, students who have not finished their degree programs are expected to vote on specialized curricular issues, assess the qualifications of their professors, and decide the research priorities of the university.

[11] This system of governance is also found outside Latin America, e.g. at Harvard University.

[12] For example, one faculty in 1974 had 20,000 students and 2,897 faculty, while in 1984 it had 11,000 students and 6,669 faculty (Carpizo 1985).

## Management

Aside from governance issues concerning who has the power to determine the objectives and policies of the university, there are administrative issues regarding how objectives and policies are implemented. These issues include incentives, information, and personnel.

As is noted repeatedly in this paper, universities lack strong incentives to improve internal efficiency or quality of academic performance. Institutional budgets are not tied to measures of cost or quality, and as such institutions are not held accountable in this sense. In response to fiscal pressures, much progress has been made in Europe and North America in this area in recent years, where standards have been adopted and incentives established. Such standards include those for development, utilization and maintenance of physical facilities; recruitment and remuneration of personnel; and the operation of support services such as libraries and laboratories. Among the incentive-based practices adopted are accreditation procedures that encompass information on standards and efficiency, and evaluation systems that entail both self-assessment and assessment by external peers who evaluate and report on the performance of departments, faculties or entire institutions. In Latin America, the CAPES evaluation program for graduate level courses in Brazil provides an excellent model of this type of external review.

Effective and efficient management requires good information on university activities, especially student flows, and finance. Up-to-date and detailed records on student admissions, enrollments, course selections, fields of study, academic performance, and other characteristics are required for university administrators to monitor progress, assess academic programs, and project resource requirements. Management information systems are generally inadequate in Latin American universities. In the absence of such a system, some institutions--e.g., San Marcos in Peru and the University of Buenos Aires--have carried out student censuses, but intermittent censuses do not allow the institution to quickly become aware of and respond to changes in student flows.

In addition to information on university activities, administrators require good financial information; this, too, is lacking in many universities. Accurate cost accounting requires information on revenue sources and classifications, and expenditure classifications, by functional or programatic area. A functional classification of revenues and costs helps establish funding requirements for different kinds of academic programs and, also, helps government to introduce performance-based incentives for resource allocation. A modern financial management system encourages accountability by providing the information required for financial and performance auditing.

Finally, in most universities there is a lack of skills in specialized areas of university administration. University administration is not, in general, yet viewed as a career; evidence of this is the paucity of programs in Latin America to train university administrators. Furthermore, the political nature of some administrative positions leads to their being filled by individuals with strong political skills rather than individuals with expertise and experience in university administration.

## B. Productivity in Higher Education

Productivity in higher education is measured by the relationship between outputs and inputs. Higher education produces a number of outputs, each of which can be measured in terms of both quantity and quality: undergraduate enrollments and degrees, graduate enrollments and degrees, research papers and publications, and public service projects. Each of these outputs has a number of attributes and a variety of possible measures; one possible framework for identifying and measuring university outputs is given in Annex II.1.[13]

Measures of the quantity of university outputs are more easily obtained than quality measures, but often neither are systematically reported in a form useful for analysis. For example, in undergraduate instruction two measures of the quantity of output are the number of full-time-equivalent students enrolled in a given time period and the number of students successfully completing all degree requirements in a given time period. Higher education institutions in Latin America always report total enrollments and sometimes report part-time and full-time enrollments, but they seldom report full-time-equivalent enrollments.[14]

An important measure of output quality in undergraduate instruction is the educational value-added to the student, the difference between knowledge upon entering the university and upon leaving the university. To be useful for analyzing internal efficiency, measures of knowledge must be comparable across institutions and over time (e.g., standardized entrance or exit examinations). While entrance examinations are required of students in many universities, they are frequently institution- specific instead of nationally uniform, and no comparable measure of educational achievement exists for university graduates. As a result, little can be said about the quality of outputs in undergraduate instruction over time in Latin American universities, in spite of widely-held perceptions that quality has diminished.

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13/ Another listing of both output and input indicators of quality and performance is provided by Cuenin (1987), who also describes the use of such measures in both intra-institutional and intra-sectoral decisionmaking relating to internal efficiency.

14/ Studies of unit costs and ratios of resources to students seldom address this issue; hence, most can be assumed to rely on questionable implicit assumptions of the relationship between reported enrollments and actual full-time-equivalent enrollments.

## The Higher Education Production Function

The higher education production function describes the technical relationship between inputs and outputs. In the case of undergraduate instruction, the production function can describe the relationship between university inputs, such as faculty, administrative staff, and facilities, and student flows (measured by full-time-equivalent enrollments); since teaching technology tends to vary by subject area, so does the production function.[15] Alternatively, the production function may describe the relationship between gains in educational achievement and university inputs, controlling for the student's own academic ability and socioeconomic background, as well as those of the student's peers. Knowledge of the production function is important for assessing the effect on educational achievement of changes in teaching technology (e.g., large lecture classes vs. small discussion classes), in teacher inputs (e.g., part-time vs. full-time teachers, or those holding masters vs. doctoral degrees), or in the curriculum.[16]

The literature on higher education production is limited, especially for Latin American universities. Received empirical work suggests universities in general do not operate efficiently; they tend to operate inside the production frontier (Carlson, 1972). And theoretical analysis of the joint production between undergraduate instruction, graduate instruction, and research implies it is more efficient to produce instruction and research in the same institution than in entirely separate ones (Nerlove, 1972).

The lack of quality measures for university instruction and the absence of empirical work on production behavior forces discussion of internal efficiency to focus on surrogates for quality and efficiency. The surrogate for quality becomes instructional inputs,[17] while the surrogate for efficiency is ratios of inputs to enrollments and graduates.

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15/ Science courses, for example, may combine large lectures with laboratories and laboratory supplies; statistics courses may combine large lectures with special problem sections and computer facilities; and, music courses often require very small classes and specialized instruments.

16/ For example, see McGuckin and Winkler (1977) for an example of how a production function can be used to assess the independent effects on educational value-added of changes in university curriculum.

17/ A listing of input and activity measures which can serve as surrogates for instructional quality are given in Annex II.2

## Quality

What is the quality of undergraduate instruction in Latin American higher education? Is it improving or getting worse? As noted above, the absence of quality measures makes it impossible to answer these questions reliably. On the other hand, circumstantial evidence provides suggestive answers.

A recent study of higher education in Peru suggests quality is low in that country.[18] Of 24 programs providing training for key occupations, only two were found where more than 50% of all students were enrolled in programs regarded as having satisfactory quality. In addition, no satisfactory programs were found to exist in several areas important for Peru's economic future: electrical engineering, metallurgical engineering, systems engineering, petroleum and petrochemical engineering.

The Peru study also suggests the quality of public university graduates may have declined over time. High demand for higher education and pressures for its democratization led to a large increase in enrollments (143% between 1970 and 1980) and declines in entrance norms, at the same time that state spending on higher education was declining in real terms. Given these circumstances, it would be surprising if quality of graduates did not decline, but one cannot necessarily conclude that educational value-added declined as well.[19]

## Productivity and Resource Allocation

How productive is higher education in Latin America? Could resources be reallocated so as to improve productivity? Crude indicators of productivity suggest it is low in Latin America. For example, of all of the students who entered UNAM in the twenty-five years 1959 - 1983, only 27.7% received degrees, and the proportion was as low as 16% in some programs (philosophy and political science) (Carpizo, 1985). In addition, the graduation rate has declined in Mexico over time[20] In Peru the ratio of graduates to enrollments in 1983 averaged less than 10% with even the very best institutions (e.g., the National Agrarian University) reporting rates less than 15% (World Bank, 1985). In Argentina, the University of Buenos Aires estimates that only one in ten students graduates. These figures compare with graduation rates of about 60% in large American public universities and 80% in elite American universities.

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[18] These results are compiled from unpublished data originating in a 1985 survey of Peruvian universities.

[19] If the marginal product of university resources in the production of educational achievement is inversely related to scores on entrance examinations, declines in both entrance scores and university resources might still lead to gains in educational achievement.

[20] Comparing the number of graduates with the number of entrants four years earlier, the graduation rate declined from 58.2% for the 1967 entering class to 39.7% for the 1974 entering class (Castrejon Diaz (1979)).

Low graduation rates imply high dropout and high repeat rates. At UNAM, for example, 50% of all entering students drop out before completing their second semester (Carpizo, 1985). Annex II.3 reports repeat rates for ICETEX loan recipients in Colombia and finds repeat rates vary directly with family income, inversely with academic ability, and are lower in private than public universities.

Part of the explanation for the current high dropout and repeat rates and low graduation rates is the decline in admissions standards as higher education enrollments rapidly expanded over the past decade, especially in those institutions having open admissions policies. But part of the explanation may also be the reduced quality of instructional services.

Reductions in expenditures per pupil, as discussed in Section I of this paper, undoubtedly contributed to a reduced quality of instructional services, but misallocation of resources may have made its own contribution. Reduced per pupil expenditures have resulted in reduced faculty salaries and reduced outlays on non-personnel resources, but staffing patterns remain high.

Information on staffing patterns is reported in Table II.1. While the statistics reported in Table II.1 suffer from inconsistent definitions and measures of faculty and students, the results suggest a general problem of overstaffing. The ratio of students to faculty in public institutions is generally lower than that found in European public universities. In addition, the ratio is lower (for Mexico) at the graduate than undergraduate level, lower in public than private universities in those countries (Brazil, Colombia) where private institutions serve as the university of last resort, and lower in private than public institutions in those countries (Argentina, Ecuador) having open admissions policies. There is also considerable variation by field, with UNAM having three schools where there are only three students per faculty member and one school where there are 74 students and 87 professors (Carpizo, 1985).

## Table II.1

## Personnel and Non-Personnel Resource Allocation, Selected Countries

| Country/Year | Ratios of Students to Teachers | Ratio of Students to Teachers and Administrators | Materials and Supplies/ Total Reccurent Costs (percent) |
|---|---|---|---|
| Argentina (1986) | | | |
| All Institutions | 22.0 | 10.7 | |
| Buenos Aires Metropolitan Area | 38.0 | 16.4 | |
| National Universities (1983) | | 15.8 | |
| Private Universities (1983) | | 6.7 | |
| Brazil (1981) | | | |
| Public Universities | 8.4 | 4.0 | |
| Private Universities | 18.0 | 12.6 | |
| Federal Universities (1986) | 6.6 | 2.2 | 10.0 |
| Univ. of Sao Paulo (1986) | 10.0 | 2.8 | 20.2 |
| Colombia (1983) | | | |
| Public Universities | 12.0 | 5.6 | 10.7* |
| Private Universities | 25.0 | 12.0 | 19.5 |
| Ecuador (1980) | | | |
| Public Universities | 22.8 | | |
| Private Universities | 17.1 | | |
| Public Polytechnics | 50.7 | | |
| Mexico (1984) | | | |
| Undergraduate level | 10.0 | | |
| Graduate level | 4.0 | | |
| Venezuela (1985) | | | |
| Public Universities | | | 9.6 |
| Europe (various years, 1981-86) | | | |
| Public Universities | 14.9 | | 34.6 |
| Humanities | 26.0 | | |
| Science | 9.8 | | |
| Engineering | 12.8 | | |
| Medicine | 9.2 | | |

Sources: Adapted from Franco (1986) for Brazil and Colombia; Cano (1985) and Gertel (1986) for Argentina; ANUIES, Anuario Estadistico 1984, for Mexico; Wolynec (1987) for Brazil and Europe; Pareja (1986) for Ecuador; Mendoza Angulo (1986) for Venezuela.

* General Expenditures divided by total recurrent expenditures.

Including both faculty and administrative staff, the ratio of students to university personnel is as low as 5.6 in public universities in Colombia and 2.2 in Brazil's federal universities. The ratio of students to university personnel is at least twice as high in private compared to public institutions in Brazil and Colombia.

The reasons for high staffing patterns in many public universities are not clear. In some countries (e.g., Mexico) the university administration and government lack control over the academic payroll. In other countries (e.g., federal universities in Brazil) the appointment of excessive numbers of administrative personnel is a mystery.[21]

The consequences of overstaffing, however, are clear. In times of diminishing real university budgets, faculty and staff positions, although not their salaries, are protected. The result is insufficient expenditures on non-personnel items of expenditures, including materials, supplies, maintenance, and investment in new laboratory and office equipment. As shown in Table II.1, the percentage of recurrent expenditures allocated to non-personnel items is only about 10% in the public universities of Brazil (federal only), Colombia, and Venezuela.[22] The similar percentage found in European public universities is almost 35%.

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21/ Also, the number of effective faculty is often overstated, as faculty are frequently "borrowed" for other public service yet in some countries remain on the university payroll; in addition, statistics on staffing patterns typically fail to distinguish between part-time and full-time faculty (i.e, ratios are not computed on the basis of full-time-equivalent faculty), which results in an especially low estimate for those institutions having high proportions of part-time faculty.

22/ The situation has apparently continued to worsen. Velloso (1987) reports that in the time period 1972 to 1986, the percent of federal university expenditures going to wages and salaries increased from 72% to 93%, while the percent going to materials and supplies decreased from 23% to 7%, and the percent going to capital works decreased from 5% to less than 1%.

### Table II.2

### Changes in the Uses of Public Funds in Higher Education, 1965-1978 (percentage of countries)

| Time Period | Wages increased more rapidly than expenditure per student: Latin America | Wages increased more rapidly than expenditure per student: Other Middle-Income Countries | Nonwage expenditure Per student decreased: Latin America | Nonwage expenditure Per student decreased: Other Middle-Income Countries |
|---|---|---|---|---|
| 1965-70 | 69 | 40 | 50 | 50 |
| 1970-75 | 50 | 50 | 50 | 50 |
| 1975-78 | 60 | 50 | 75 | 66 |
| 1970-78 | 80 | 100 | 100 | 100 |

Source: Heller and Cheasty (1984).

As shown in Table II.2, the allocation of funds to non- personnel items has become worse over time. Non-wage expenditures per student decreased in real terms in all Latin American countries between 1970 and 1978. More recent evidence indicates continued reductions in real non-wage expenditures. In Brazil between 1980 and 1985, real non-wage expenditures in the federal universities declined by 64%.[23]

At the same time wages as a share of total higher education expenditures was increasing, real faculty salaries were declining. For example, real faculty salaries in Argentina in 1985 were one-third what they were in 1980.[24] And while overall staffing patterns tend to be high in public higher education, the proportion of faculty who are full-time is relatively low. Table II.3 shows the percentage of faculty who are full-time is less than 30% in Colombia and Mexico.

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23/ Brazil, Ministerio da Educacao e Cultura, 1985, Table II.

24/ See Annex II.4

Table II.3

Faculty Exclusively Dedicated to University Employment
(Percentage of Total Faculty)

| Country | 1975 | 1980 | 1985 | Notes |
|---|---|---|---|---|
| Brazil | | | | |
| federal universities, undergraduate level | | | 74.3 | |
| private universities | | 16.9 | | |
| private isolated faculties | | 11.6 | | |
| Colombia (National University) | 27.0 | 26.0 | | |
| Mexico | | | | |
| undergraduate | | | 19.6* | |
| graduate | | | 25.4* | |
| * 1984 | | | | |

Source: Colombia: Lopez P. (1984); Mexico: ANJIES, Anuario Estadistico 1984; Brazil: Tramontin and Brags (1984), MEC, Sinopse de Ensino Superior 1985.

One of the consequences of declining real wages, as well as work environments made less attractive by the lack of instructional and research support, is that even full-time faculty acquire supplemental employment and become de facto part-time faculty.

## C. Higher Education Costs

Higher education costs, per enrollee and per graduate, vary considerably within and between institutions. Given this variation, governments infrequently use cost as a criterion for allocating funds or determining which institutions to expand and which to contract. For example, in Mexico, UNAM receives 74% of federal higher education funds and produces 42% of the graduates, compared to 3.9% of funds and 7.6% of graduates for Guadalajara and 2.0% of funds and 7.2% of graduates for Veracruz. While differences in institutional missions, objectives or quality may explain cost differentials, differences in efficiency can also explain them. If cost is not used as one criterion for resource allocation, government may be rewarding inefficient behavior.

## Average and Marginal Costs

To use cost as a criterion for either intra-institutional or intra-sectoral resource allocation requires information on average or unit costs by department and by field of study or major.[25] The standard prescription is for faculty salaries to be allocated to courses (by level or department) according to the proportions the courses take of faculty time in the classroom. The result is a unit course cost or a unit credit cost for faculty time. Indirect costs can also be apportioned to courses to yield the total unit course cost, which can be combined with students' course selection patterns to yield per student costs by field of study or major. Planners can then use historical data on course choices to compute "induced course loads," i.e., the impact of changes in course enrollments in general or by majors on the entire institution. These data are used for internal budgeting purposes (intra-institutional resource allocation) as well as justifying funding requests of the public authorities (intra-sectoral resource allocation).[26] Disaggregated measures of costs are required because average or unit costs are typically found to vary by field or discipline, level of instruction, size of institution or program, and revenues.[27]

The calculation of direct and indirect costs entails use of an accounting framework, which uses somewhat arbitrary rules for assigning and allocating costs. University fund accounting typically divides costs into direct costs for three activities-- instruction, research, and public service--and indirect costs associated with institutional support (general administration), academic support (libraries, computer center), student services (admissions, counseling), and plant operation and maintenance. Also, there are auxiliary enterprises such as a bookstore, cafeteria, or hospital, each of which have their own fund account. All the direct, indirect, and auxiliary funds enter the current budget of the university. Universities, of course, are multiproduct organizations, and some of their products (undergraduate and graduate instruction; research and instruction) are jointly produced. Allocation of costs among jointly-produced goods is always somewhat arbitrary.

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[25] This presumes a modern departmental organization wherein students in a particular field of study select courses from a variety of departments; in the traditional school or faculty all classes are typically taken within the school itself.

[26] Typically, depreciation expenses and opportunity costs of funds used for plant and equipment are ignored in these unit cost calculations, although they may be used in setting institutional overhead rates for government and business contracts.

[27] For example, the ratio of unit costs at the masters level to the undergraduate level in the U.S. falls in the range 2.59 to 3.87, while the ratio of unit costs at the doctoral level to those at the undergraduate level ranges from 4.28 to 9.12. There is also evidence that institutions with higher incomes simply spend more (Brinkman, 1986).

Average costs may vary with the size of the program or institution as well as with the scope of activities of the institution. In general, studies of higher education cost functions in the U.S. and U.K. find the ratio of marginal to average costs in instruction fall in the range 0.5 to 0.7 (Verry and Davies, 1976; Brinkman, 1986).[28]

A survey of higher education cost functions estimated for U.S. and U.K. institutions provide some evidence on economies of scale; average costs decrease as departmental and institutional size increase, at least up to a point. For example, Brinkman (1986) shows that average costs decrease in several areas as institutions increase in size from 600 to 2400 students: instruction (16%), administration (34%), library (20%), operation and maintenance of plant (26%). Several studies show essentially flat marginal costs beyond some minimum size of the institution. In his survey, Brinkman concludes scale economies are probably exhausted at 2000 students for liberal arts undergraduate institutions and 4000 students for more comprehensive institutions. In their work, Cohn and Santos (1986) find scale economies up to about 25,000 for research universities.

The evidence on economies of scope--the extent to which joint production is efficient--is less voluminous than that on economies of scale. James (1978) found the average cost per lower-division student to be less in research universities than at two-year colleges. Cohn and Santos (1986) provide some empirical evidence for economies of scope in the production of instruction and research.

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28/ Evidence on cost functions and estimates of marginal costs can be questioned on a number of grounds: (i) universities do not necessarily minimize costs and, thus, do not operate on the production frontier; (ii) even if they wish to minimize costs they may not know how to do so, and the lack of price competition does not force them to do so; (iii) the functional form of the cost function is not obvious, and marginal cost estimates are sensitive to functional form.

Table II.4

Public Expenditure Per Student in Latin America and Other Major World Regions, 1980
(as percentage of per capita GNP)

| Region | Primary | Secondary | Higher | Unit Cost in Higher Education/ Unit Cost in Primary Education |
|---|---|---|---|---|
| Anglophone Africa | 18 | 50 | 920 | 51.2 |
| Francophone Africa | 29 | 143 | 804 | 27.7 |
| South Asia | 8 | 18 | 119 | 14.9 |
| East Asia and Pacific | 11 | 20 | 118 | 10.7 |
| Latin America | 9 | 26 | 88 | 9.8 |
| Middle East and North Africa | 2 | 28 | 150 | 75.0 |
| Developing Countries | 14 | 41 | 370 | 26.4 |
| Developed Countries | 22 | 24 | 49 | 2.2 |

Source: Adapted from Mingat and Tan (1986)

## Unit Costs in Latin America

As shown in Table II.4, expenditures per student in public higher education in Latin America are not high compared to other developing regions of the world, although, expressed as a percentage of per capita GNP, they are high relative to developed countries. Also, the ratio of unit cost in higher education to unit cost in primary education is lower in Latin America than other developing regions, although higher than developed countries. Comparing Latin America only to other middle income countries, however, differences in this ratio appear to be minor, especially given variation over time (see Table II.5). What is most striking about Table II.5 is the evidence that unit costs in higher education have consistently declined over time, whether measured in absolute (real expenditure per student) or relative terms (relative to per capita income or unit cost of primary education). As shown earlier in Table I.5, unit costs in public higher education for several countries appear to have continued their decline between 1980 and 1985.

## Table II.5

## Public Expenditures per Pupil in Higher Education in Absolute and Relative Terms, 1965 - 1981

| Category | 1965 | 1970 | 1975 | 1981 |
|---|---|---|---|---|
| Latin America | | | | |
| Average Real Expenditure per Student (in $ US) | $1,133 | 970 | 766 | 991 |
| Average Expenditure per Student Relative to per Capita Income | 1.41 | 1.00 | 0.83 | 0.67 |
| Higher Education Expenditures per Student Relative to Primary Education Expenditure per Student | 16.60 | 13.60 | 11.50 | 8.10 |
| Higher Education Expenditure per Student Relative to Secondary Education Expenditure per Student | 7.90 | 7.10 | 5.10 | 5.71 |
| Other Middle Income Countries | | | | |
| Higher Education Expenditure per Student Relative to Primary Education Expenditure per Student | 9.10 | 13.10 | 9.30 | - |
| Higher Education Expenditure per Student Relative to Secondary Education Expenditure per Student | 5.20 | 8.60 | 6.00 | - |

Source: Adapted from Heller and Cheasty (1984) and Schiefelbein (1987).

Finally, there is evidence of variation in unit costs depending on field of study and type of institution. Table II.6 summarizes unit cost information by institutional type for a number of countries. In the absence of information on instructional quality (as well as the mix of activities of the university) little can be concluded from these data. Unit costs are higher at the Catholic University in Rio than other Catholic universities, for example, because it has such a large amount of contract research activity. The Catholic University in Lima has higher costs than other private institutions in Peru and is, also, perceived to be of higher quality. The question these data motivate is: are the differences in educational outputs between institutions large enough to warrant the difference in costs? For example, does a federal university in Brazil generate six times the output per student as does a Catholic university in Brazil? If the answer to these questions is "no", internal efficiency could clearly be improved.

Table II.6

Unit Costs in Public and Private Universities
(in 1984 US$)

| Country/Institution | Public | Private |
|---|---|---|
| Brazil | | |
| Federal Universities | 4,074 | |
| Catholic Universities | | 720 |
| Colombia | | |
| Public Universities | 2,418 | |
| Private Universities | | 1,004 |
| Mexico | | |
| Public University (UANL) | 1,035 | |
| Public Normal School (NENL) | 253 | |
| Public Polytechnic (ITRA) | 1,687 | |
| Private University (UCEM) | | 1,664 |
| Peru | | |
| San Marcos University | 278 | |
| Other Public Institutions | 440 | |
| Catholic University of Lima | | 794 |
| Other Private Institutions | | 353 |

Source: Institutio de Planjamento Economico e Social (IPEA) (1987), Annexes II.5, II.6, II.7

## D. Policy Choices

Higher education in Latin America has gone through difficult fiscal times. Real expenditures per pupil have decreased, non- personnel outlays have diminished, and, by inference, undergraduate instructional quality has declined. Strong arguments can be given that per pupil expenditures should be increased, but existing misallocation of resources provides no assurance that additional spending would be used efficiently. Recommendations and policy choices follow. It should be noted that the political and administrative feasibility of these recommendations varies by country and depends on prevailing values regarding university autonomy and the role of private higher education.

Although compared to other countries and viewed over time, unit costs in public higher education are not excessively high, they may still be higher than they need be given existing quality levels of university activities and outputs. To summarize the above discussion on internal efficiency, unit costs could be reduced through the following kinds of actions:

1. Public funds should be allocated among institutions in a more cost-effective manner. Government funds should be allocated among both public and private institutions so as to maximize the desired combination of university quantity and quality. The funding authorities should assess both the quality and the cost of alternative institutions and allocate funds consistent with that assessment, in some cases rewarding institutions for their cost- effectiveness and in other cases providing additional funds to bring programs up to minimum levels of quality. In those cases where institutions (either public or private) appear to provide a given quality of instruction at lower cost, fiscal incentives should be provided to encourage expansion of those institutions while possibly contracting selective programs in other institutions.

To allocate funds consistent with cost-effectiveness criteria requires the development of information systems and planning and analytic capacity both in the education ministry and the universities. The political and administrative constraints to doing so loom large in some countries.

2. Objective criteria should be used in the intra- institutional allocation of resources. Criteria of cost, performance, student demand, and employment opportunities should be more widely used in allocating resources within higher education institutions. Use of these criteria implies information on them exists and also implies the existence of university planning offices to assemble data and conduct analyses to guide resource allocation. Determination of cost by university unit may require changes in internal accounting systems that permit distinctions between direct and indirect costs within the unit and overhead costs of the overall institution. Determination of performance requires, at a minimum, self-evaluation by the unit and should include periodic external evaluations.[29]

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[29] See Annex II.8 for one self-evaluation model.

Student demand can often be directly measured by comparing applications for admission to a course of study with the number of positions available. Employment opportunities would ideally entail tracer studies of graduates of the unit to discover whether or not graduates work in the field in which they have been trained and to evaluate their career success. Academic units rarely have the capacity to carry out such studies, however; economies of scale in conducting tracer studies argues for their being done by the central administration.

The development of cost and output information at the unit level would facilitate planning and coordination at the institutional and sectoral levels. If used in decisionmaking, this information would lead to both winners and losers among academic units, with implications for political feasibility of adopting such an information system.

3. Personnel expenditures should be reallocated so as to improve instructional quality. The ratio of students to faculty and administrative staff should be increased in many institutions and the wage savings used to increase faculty quality and the proportion of full-time faculty. Increasing the student-faculty ratio can occur through enrollment expansion and more intensive use of capital facilities, such as the introduction of night classes, in some cases. In other institutions, the number of part-time faculty might be reduced and class sizes increased. Savings resulting from larger class sizes and higher student- faculty ratios could be used to employ more faculty with advanced degrees or to employ more full-time faculty (who in fact work full-time). Either alternative might, also, require increases in real faculty pay levels.

4. Expenditures on non-wage items should, in general, be increased, and increased as a proportion of the overall university budget. Outlays on materials, supplies, equipment, and maintenance are inadequate and constitute a bottleneck to improving instructional quality. Since non-wage expenditure is the first item to be cut in difficult fiscal times, norms of non-wage outlays per pupil or per faculty member should be established as a guide to future budgeting.

5. The unit cost per graduate should be decreased by reducing repetition rates. Repetition rates can be reduced through a number of alternative policies: (i) more selective admission screening procedures, (ii) improved student advisement services, (iii) increased tuition in public institutions to discourage use of the university either as a consumption good or a means of waiting out the correct employment offer, and (iv) scholarships and/or loans to enable low income students to spend more time in study and less in work. Other policies which could reduce the cost per graduate would terminate early students who fail to make timely progress towards completion of the degree. The costs and benefits of each of these alternatives should be studied prior to selecting one or some combination of alternatives.

6. Admissions procedures should be organized to minimize costs to the institution and, also, provide comparative data on the quality of entering students. Higher education entrance examinations should be standardized across like institutions to reduce administrative costs and to permit comparisons regarding student quality and comparative evaluations of educational achievement. Examination fees should be set to cover the costs of developing, administering, and evaluating the examinations and, also, to discourage the unprepared and frivolous taking of exams.

7. Accreditation agencies or other organizations (education ministry, council of rectors) should carry out external evaluations of both programs and institutions to guide improvement in, and assure minimum levels of, instructional quality. Careful evaluations by peers should be required to initially accredit programs and institutions, and accreditation should be for a limited time period, say five years, with reaccreditation again requiring careful external evaluation. The accrediting body can either be governmental or independent.

8. Management of universities should be improved through introduction of management information systems on student and financial flows and specialized training of university personnel. While the existence of management information systems on students and finance does not assure the rational use of information in decisionmaking, it is a necessary condition for internal efficiency. Unlike some other possible policy actions, improvement of information is likely to have high political feasibility.

# III. EXTERNAL EFFICIENCY

## A. Introduction

The governments of Latin America have faced difficult times in recent years as high foreign debt payments, low or negative economic growth, and reduced mineral and oil revenues have resulted in reduced revenues available for public investment. This constraint on public investment makes it all the more important to allocate those resources available so as to maximize the welfare of citizens both now and in the future. Maximization of social welfare under a constrained public budget is the essence of external efficiency. Analysis of the external efficiency of higher education attempts to answer two questions: (i) should more or less of society's scarce resources be allocated to higher education? and (ii) are there ways in which the existing level of higher education investment could be reallocated so as to improve society's welfare?[30] Questions regarding external efficiency are typically answered using the techniques of social cost-benefit analysis. The questions posed above can then be more precisely restated as whether or not society can reallocate the resources expended on higher education so as to raise the rate of return on its investment.

One difficulty in answering external efficiency questions in higher education is that universities and related institutions are multiproduct firms generating a variety of pecuniary and nonpecuniary benefits. In particular, universities typically engage in three key activities -- instruction, research, and public service/extension work-generating a variety of benefits -- skilled labor, new knowledge, and a better informed citizenry. Some of these benefits, are in principle easily measured and evaluated in monetary terms. Skilled labor should be reflected in higher wage rates to the recipients of university instruction. New knowledge should result in new technologies leading to higher economic growth. And better information should lead to a more productive citizenry. But not all benefits are pecuniary in nature and not all pecuniary benefits are easily determined, thereby making it difficult to accurately evaluate external effiency in higher education.

The literature on external efficiency in higher education is primarily concerned with comparing the costs of instruction with the additional earnings associated with education. There are, however, a number of benefits ignored by this type of analysis. These range from the private consumption benefits enjoyed by students to the enhanced productivity generated by new technology and a better-informed community and the social benefits associated with new works of art and a better-educated populace. Societies may highly value these less measureable and less tangible benefits of higher education and use them in part to justify subventions to higher education.

The remainder of this section reviews the evidence on external efficiency of higher education from the limited perspective of the gain in

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30/ Implicitly, this traditional definition of external efficiency views higher education as one of many factors contributing to the nation's human capital stock and economic growth; some critics strongly reject this view of the role of higher education (Figueiredo, 1987).

earnings associated with instructional activities. The efficiency of graduate education and research is considered separately in a later section. The benefits associated with extension activities and undergraduate faculty research are ignored. While ignoring these benefits serves to understate the return to society's investment in higher education, the magnitude of these benefits may not be large. Frequent complaints are made of the Latin American university's lack of extension activities, weak ties to other important social institutions, especially government and business, and low research productivity. Levy (1985), for example, cites dissatisfaction among both government and university officials regarding the ivory tower status of the Mexican university.[31]

## B. Supply of and Demand for Skilled Labor

External efficiency in university instructional activities is typically evaluated by comparing the costs of university instruction, discussed earlier, and the benefits of that instruction, as measured by gains in earnings. In competitive labor markets, earnings in turn are determined by the supply of and demand for college-educated labor. Earnings or wage rates, however, are not always found at market clearing levels, resulting in either surpluses (unemployment or underemployment) or shortages (unfilled vacancies). Thus, in addition to comparisons of costs and earnings, measures of surpluses or shortages of skilled labor provide evidence of external efficiency.

Two characteristics of the labor market for professionals explain why surpluses or shortages may exist. The first is the phenomenon of "sticky" wages in which market wage rates fail to move very quickly to market clearing levels, resulting in either shortages or surpluses of labor at existing wage rates; this phenomenon is less of a problem in inflationary economies where "sticky" nominal wages are unlikely to prevent adjustment to market clearing real wage rates. The second is the long gestation period required to produce some technical (e.g., engineering) and professional (e.g., medicine) skills. The result is a "cobweb" model of persistent disequilibrium; this model best describes labor markets where the training period is long and highly specialized and where professionals in other fields cannot easily acquire the training required to move into the specialized field when wage rates are high (Freeman, 1971).

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[31] Weak ties between the university and government and business can in part be traced back to the Cordoba movement which brought about a unique degree of autonomy to the Latin American university.

## Table III.1

## Higher Education Expansion, Unemployment and Earnings in Venezuela

| | 1961 | 1971 | 1975 | 1981 | 1984 |
|---|---|---|---|---|---|
| Higher Eduction Enrollments | 24,907 | 85,675 | 193,264 | 298,884 | 378,209 |
| Number of Graduates | 1,825 | 5,931 | 9,250 | 15,250 | 24,933 |
| Aggregate Unemployment Rate | | 5.81 | | 6.04 | 12.42 |
| Higher Education Unemployment Rate | | 2.79 | | 3.91 | 9.94 |
| Ratio of Higher Education to Aggregate Rates | | 0.48 | | 0.65 | 0.80 |
| Percent of Total Unemployed Who Have Higher Education | | | | 5.10 | 7.60 |

Annual Earnings in 1975 Bolivares and US$*

| | 1975 (B) | 1975 ($) | 1984 (B) | 1984 ($) |
|---|---|---|---|---|
| All Higher Education | 48,461<br>(21.5) | 11,309 | 31,726<br>(15.0) | 6,034 |
| University | 51,366<br>(23.1) | 11,967 | 32,964<br>(15.6) | 6,528 |
| Field | | | | |
| Science | 48,061<br>(17.1) | 11,216 | 24,924<br>(10.9) | 4,740 |
| Law | 54,606<br>(n.a) | 12,744 | 38,856<br>(14.1) | 7,389 |
| Humanties & Education | 35,608<br>(12.4) | 8,310 | 26,195<br>(8.0) | 4,982 |
| Engineering | 56,430<br>(n.a.) | 13,169 | 36,776<br>(20.3) | 6,994 |
| Economics & Social Science | 49,163<br>(21.5) | 11,473 | 32,760<br>(15.7) | 6,230 |

* Private rate of return given in parentheses.

Source: Adapted from Tovar and Negretti (1985) and Psacharopoulos and Steier (1988).

As noted earlier, higher education enrollments in Latin America have grown swiftly since 1960. This has in turn been mirrored in rapid growth in the economically active college- educated population. Table III.1 shows that the number of new college graduates entering the labor force tripled in one decade (1971 - 1981) in Venezuela. Furthermore, as shown for Mexico in Table III.2, enrollments have grown much more rapidly in some fields than others; enrollments in business administration increased by about 450% between 1970 and 1984, while enrollments in medicine increased about 150%.

Table III.1 also demonstrates that the demand for college-educated labor did not grow as rapidly over time as the supply of that labor. The unemployment rate among the college-educated in Venezuela increased from 2.79% in 1971 to 3.91% in 1981, with a further increase to 9.94% in 1984.[32] These data, however, in part reflect the severe economic crisis Venezuela faced after the 1974 oil shock, which increased the aggregate unemployment rate in the economy. More surprising than the growth in unemployment rates for college-educated labor is the absorption by the economy of large numbers of new college graduates.

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32/ A recent study by the Inter-American Development Bank (1987) confirms the same trend for Chile and Colombia between 1980 and 1984.

## Table III.2

## Enrollments by Undergraduate Field of Study, Selected Countries

| Country/Field | 1970 | 1980 | 1985 |
|---|---|---|---|
| Mexico 1/ | | | |
| Medicine | 29,391 | 90,701 | 72,478 |
| Law | 22,605 | 60,623 | 81,181 |
| Chemical Engineering | 10,409 | 14,176 | 16,954 |
| Economics | 7,128 | 19,535 | 19,515 |
| Business Administration | 11,381 | 41,220 | 62,118 |
| Brazil | | | |
| Medicine | | | 48,231 |
| Law | | | 132,373 |
| Economics | | | 64,863 |
| Physics | | | 10,199 |
| Uruguay 2/ | | | |
| Medicine | 4,573 | 4,720 | 7,538 |
| Law and Social Science | 8,581 | 10,960 | 19,756 |
| Engineering | 810 | 1,836 | 7,322 |
| Economics | 4,562 | n.a | 8,427 |
| Administration | n.a | 1,183 | 4,048 |
| TOTAL | 27,475 | 29,868 | 60,415 |
| Venezuela | | | |
| Medicine | | 16,940 | |
| Law | | 15,567 | |
| Chemical Engineering | | 3,822 | |
| Civil Engineering | | 12,188 | |

1/ 1985 data refer to 1984

2/ 1970 data refer to 1972

Source: Brazil: Ministerio da Educacao, (1986).
Mexico: Hughet (1986); Venezuela: Nery (1985); Uruguay: Cresalc.

## C. Indicators of Efficiency

The most commonly used indicator of external efficiency in education is the estimated rate of return to the educational investment. This estimate is calculated by comparing the costs of education to the gain in earnings associated with the additional education. Estimated rates of return to higher education are available for most countries in Latin America. There are, however, several caveats of which one should be aware in interpreting rate of return estimates:

1. Higher education may serve as an expensive screening device for a variety of productivity-related abilities rather than actually contributing to worker productivity.[33] While not easily refuted, the "screening hypothesis" fails to explain why employers do not develop cheaper methods of screening than several years of expensive education.

2. The larger earnings associated with higher education may largely reflect the higher ability and socioeconomic background of students, as well as after-school investment in human capital.[34] Estimates of earnings functions demonstrate that ability and other characteristics of the individual do indeed contribute to earnings, but controlling for those factors education continues to explain 70 to 80 percent of gains in earnings (Psacharopoulos, 1975).

3. The rates of return typically estimated and reported in labor market studies are of limited usefulness in making public policy decisions regarding expansion or contraction of the supply of higher education places. Public policy decisions require a comparison of the additional costs of expansion with the earnings of the additional graduates, i.e., estimates of marginal rates of return.

4. Estimated rates of return are useful for answering questions regarding the appropriate supply of higher education places but ignore the equally important question of the returns to investing in education by improving the quality of schooling.[35]

5. In countries with large regional differences there may be geographical aggregation bias, which imparts an upward bias to country-wide estimates of returns to schooling due to geographic variation in quality of schooling, living costs, and labor markets.[36]

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33/ See Winkler (1987) for a summary exposition of the screening hypothesis.

34/ See Griliches and Mason (1972) for further explanation of this argument.

35/ See Behrman and Birdsall (1983) for an elaboration of this argument.

36/ Birdsall and Behrman (1984) found a large geographical aggregation bias for Brazil, while Stelcner, Arriagada, and Moock (1987) found the same to be true for Peru.

6. Rates of return are estimated using either historical or cross-sectional data on earnings. In either case, the estimated rates of return may not be an accurate indicator of the returns to new investments, especially in an environment where the college-educated labor force is expanding rapidly.

While each of the above criticisms has some validity, the estimated rate of return to education remains an easily understood and widely accepted measure of efficiency. It has the further advantage that considerable empirical work has already yielded a wealth of information regarding rates of return in Latin America and elsewhere.

## D. Evidence on External Efficiency for Latin America

A review of the existing empirical research on the labor market for college-educated labor in Latin America yields the following conclusions:

- The private return to higher education remains very high, although there is some evidence that it has declined over time as the participation rate in higher education has increased;
- The social rate of return to higher education also appears to have declined over time and is probably lower than the return to alternative non-educational investments in some countries;
- The social rate of return to higher education is considerably lower than the social return to investments in primary education, suggesting the overall return to society's investment in education could be improved by reallocating some of public outlays from the higher to the primary level;
- Private returns to education vary considerably across fields of specialization with engineering typically yielding the highest return, followed by law and management, with education yielding the lowest return;
- The ratio of the unemployment rate for college-educated labor to the aggregate unemployment rate has increased with the size of the college-educated workforce.

## Table III.8

## Private and Social Rates of Return to Education

| Country/Region | Year | Social<br>Primary | <br>Secondary | <br>Higher | Private<br>Primary | <br>Secondary | <br>Higher |
|---|---|---|---|---|---|---|---|
| Argentina | 1975 | 16.7 | 6.4 | 7.1 | 30.0 | 9.0 | 11.0 |
| Brazil | 1970 | | 23.5 | 13.1 | | 24.7 | 13.9 |
| | 1980 | | | | 12.7 | 18.1 | 18.2 |
| Chile | 1959 | 24.0 | 16.9 | 12.2 | | | |
| | 1982 | 12.1 | 9.0 | 6.8 | 27.8 | 11.2 | 10.1 |
| Colombia | 1976 | | | 18.4 | | | 24.9 |
| | 1985 | | | | 7.0 | 9.0 | 13.0 |
| Mexico | 1963 | 25.0 | 17.0 | 23.0 | 32.0 | 23.0 | 29.0 |
| Paraguay | 1982 | 14.0 | 11.0 | 13.0 | | | |
| Peru | 1974 | 34.3 | 9.0 | 15.0 | | | |
| | 1980 | 41.4 | 3.3 | 16.1 | | | |
| | 1985 | | | | 12.7 | 7.6 | 10.9 |
| Venezuela | 1957 | 82.0 | 17.0 | 23.0 | | 18.0 | 27.0 |
| | 1975 | 16.4 | 14.6 | 11.2 | 24.5 | 20.2 | 21.5 |
| | 1984 | 17.5 | 10.5 | 8.7* | 24.3 | 12.4 | 15.0* |
| Averages | | | | | | | |
| Latin America | | | | 14.0 | | | 17.7 |
| 1980 or earlier data | | | | 16.5 | | | 22.4 |
| data after 1980 | | | | 8.9 | | | 12.0 |
| Africa | | | | | 45.0 | 26.0 | 32.0 |
| Industrialized Countries | | | | | | 12.0 | 12.0 |

Sources: Argentina: Kugler and Psacharopoulos (1988); Brazil: Psacharopoulos (1987a); Chile: Riveros (1986); Colombia: Mohan (1985); Peru: Stelcner et.al (1987); Venezuela: Psacharopoulos (1988); other countries from Psacharopoulos (1985).

* Numbers given are for all higher education; for university education alone, the social return was 11.6 in 1975 and 10.7 in 1984, and the private return was 23.1 in 1975 and 15.6 in 1984.

Recent evidence on private and social rates of return to higher education is reported in Table III.3. As is to be expected, estimated private returns, which consider only private costs, are higher than estimated social returns, which include public subventions in the educational investment. For the one country (Venezuela) for which equivalent comparisons can be made over time, both the private and social rates of return declined in the decade between 1975 and 1984. In addition, a perusal of Table III.3 shows the private and social returns to higher education are lower after than before 1980. Estimated social returns are now low enough in some countries (e.g., Argentina, Chile, Venezuela) to question whether increases in public subsidies to higher education are warranted on external efficiency grounds. Further expansion of the higher education system in these countries should probably be financed privately, either via expansion of private universities or self-financed (i.e., tuition and fees) expansion of public universities.

As reported earlier, the unit costs of higher education have decreased in recent years. Reduced rates of return to the higher education investment thus reflect lower earnings not higher costs. An unanswered question is whether earnings are lower because the supply of college-educated labor has expanded more rapidly than demand for employment that traditionally requires such labor, or whether earnings are lower because college- educated labor is now taking employment previously filled by less educated employees. One study in Brazil reveals the existence of substantial underemployment as reported by college graduates themselves.[37]

Table III.3 also confirms an already well-known phenomenon-- rates of return to primary education far exceed those to higher education. The implication of this finding is that reallocating public resources from higher to primary education would improve the overall return to society's investment in education; i.e., education's contribution to economic growth could be improved. What Table III.3 does not reveal is the potential return to reallocating some resources from expansion of enrollment to improving the quality of undergraduate instruction.

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[37] See Velloso (1987); key results of the study are reported in Annex III.2

### Table III.4

### Monthly Incomes for Peruvian College-Educated Males, 1971

| | |
|---|---|
| Estimated income for college-educated males graduated from private universities in the Lima-Callao metropolitan area with a specialty in engineering, controlling for age, marital status, public/private sector of employment, and socio-economic origin. | 12,148 |
| Adjustments to estimated income: | |
| 1. attended public university | - 6.1% |
| 2. attended provincial university | - 19.9 to - 29.3% |
| 3. attended university elsewhere in Latin America | + 22.2% |
| 4. attended foreign university outside Latin America | + 39.0% |
| 5. majored in field other than engineering | |
| social science | - 9.1% |
| natural science | - 19.7% |
| law | - 30.0% |
| administration and accounting | - 46.4% |
| philosophy and letters | - 50.2% |
| public health and medicine | - 57.4% |
| education | - 67.8% |

Source: Computed from Carnoy (1978), Table 4, p. 16.

In a world of perfect information, mobile individuals and resources, and perfectly elastic supply of university positions, the private rate of return would be equal for all fields of specialization.[38] None of these conditions, of course, are true, and evidence from Venezuela (Table III.1) and Brazil demonstrates wide variation in private rates of return.[39] The estimated private return to engineering is, for example, 29.0% in Brazil and 20.3% in Venezuela, while education yields a return of only 8.0% in Venezuela. The evidence from Peru (Table III.4) shows that income levels are highest for engineering and lowest for education. In addition, income levels in Peru are higher for graduates who attended private than public universities, metropolitan Lima rather than provincial universities, and foreign vs. Peruvian universities.

Again, in a world of perfect information and mobile factors of production, government would allocate its resources such that the social rate of return would be equal across fields. As shown for Venezuela in Table III.1 such is not usually the case. The overall return to Venezuela's investment in higher education could be raised by increasing resources allocated to (and expanding enrollments in) science and economics while reducing resources allocated to humanities and education. Unfortunately, detailed estimates of social rates of return by field of study are not available for other countries, although there are anecdotal reports of misallocation of resources across fields. A recent World Bank study of higher education in Peru, for example, reports that at present some 5,000 students are being trained in mining engineering, yielding 200 graduates per year for an estimated 35 new openings annually.

Estimated rates of return do not fully capture recent changes in the labor market for college graduates, and that labor market has changed quickly on the supply side with large increases in higher education enrollments as well as on the demand side with the growth of sophisticated manufacturing sectors in some countries. Recent changes in the college labor market are to some extent reflected in rates of unemployment and underemployment. Aggregate unemployment rates, of course, have risen in most countries in recent years as a result of the severe economic recession experienced by the region. As shown in Table III.1, the aggregate unemployment rate more than doubled between 1981 and 1984 for Venezuela.

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38/ For this statement to be true, the private non-pecuniary benefits associated with different field would, also, have to be equal.

39/ See Psacharopoulos (1987) for estimated private rates of return to specialized university fields in Brazil.

Table III.5

Higher Education Unemployment Trends, 1980 - 1984

| Country | Percent of Unemployed with Higher Level Education 1980 | Percent of Unemployed with Higher Level Education 1984 | Percent Increase in Number Unemployed by Education Level No University | Percent Increase in Number Unemployed by Education Level University Level |
|---|---|---|---|---|
| Colombia | 9.5 | 12.0 | 40.4 | 81.0 |
| Chile | 5.0 | 6.6 | 72.5 | 131.8 |
| Venezuela | 5.1 | 7.6 | 143.0 | 264.7 |

Source: Inter-American Development Bank (1987), Table VIII-9.

Higher education unemployment rates have also increased in recent years. Furthermore, the ratio of the higher education to the aggregate unemployment rate has increased significantly over time, from 0.48 in 1971 to 0.80 in 1984 for Venezuela. Another way of looking at the same phenomenon is reported in Table III.5. The number of college educated unemployed has risen much more rapidly than the non-college educated unemployed between 1980 and 1984 in Colombia, Chile, and Venezuela.[40] These data provide some evidence that wage rates for the college educated need to decline further in order to bring about the historically low unemployment rates experienced by this labor group. In other words, the diminishing rates of return already observed for college educated labor may become even lower in the future.

## E. Explaining Persistent Disequilibria

The above analysis reveals two specific problems regarding external efficiency in Latin American higher education. First, the social rate of return to higher education is lower than that to other educational investments (especially primary education), yet this has not led to a reduction in higher education's share of the public education budget. The rate of return to higher education has declined, yet enrollments continue to expand. Second, the private and social rates of return (as well as employment opportunities) vary considerably by field of study, yet this has not led to major shifts in resource allocation across fields within the university. If both individuals and governments seek to maximize the return to their investments, why do these disequilibria persist?

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[40] The difference in unemployment rates between college graduates and college dropouts, however, is striking. Annex III.1 reports an unemployment rate of 6.5% for Colombian college graduates in 1984 compared to 16.6% for college dropouts.

## Primary vs. Higher Education

Why is there continued overinvestment by government in higher education relative to primary education? Numerous scholars as well as multilateral and bilateral development agencies have observed this phenomenon and recommended higher priorities be assigned to primary education. They have also noted the historical experience of most developed countries and the recent experience of fast-developing Asian countries, which assured universal access to lower levels of schooling before developing large systems of higher education.

Three hypotheses (not mutually exclusive) can be offered as explanations for the inattention to estimated rates of return on higher vs. primary or secondary education. First, until recently social rates of return to higher education were high and unemployment rates of college educated labor were low. Hence, higher education, like primary education, warranted expansion and increased public outlays. Furthermore, in an era of rising government and ministry of education budgets there was no need to think in terms of tradeoffs between investments in primary and higher education. Investments in both subsectors were desireable, and budgets in both increased. It was only at the beginning of the decade of the 1980's that educational resources became tightly constrained, leading to reductions in real expenditures per pupil at all levels of education.

A second hypothesis is that in most countries there is no systemwide planning of the educational sector which forces consideration of tradeoffs between primary level and university level investments. Secretaries of primary education and higher education are both located within the ministry of education and report to the minister and, typically, the secretary general. But planning secretariats within the education ministry often play a minor role in influencing resource allocation within the sector and are disconnected from the budget-setting process.[41] Symptomatic of their limited role is the belief among most high level ministry officials that there is in fact no tradeoff in expenditures between educational levels. This belief is credible in these countries, especially in Central America, which earmark revenues for higher education in their Constitutions.

Interest group politics constitutes the third hypothesis. Relative to primary education, higher education can more effectively press its case for budgetary outlays. Many high level ministry officials hold concurrent university appointments, are on temporary leave from regular faculty appointments, or were formerly affiliated with some university. Thus, they are already familiar with higher education problems and provide ready access to university officials wishing to press their own views.

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41/ Of course, in federal systems like Brazil and Mexico the ministry of education plays only a limited role in determining overall allocations of expenditures between educational levels.

## Differences by Field

Why do disequilibria persist in employment opportunities and rates of return to specialized fields of instruction? Two related questions are: (i) why don't higher education authorities reallocate resources from areas of low return to areas of high return, and (ii) why don't students select the areas of high return?

Unlike the primary-higher education tradeoff, the problem of resource allocation across fields is widely recognized by education officials in Latin America.[42] The causes of this problem include the fixed nature of faculty resources, constraints regarding faculty salaries, the lack of incentives on the part of public universities to respond to market signals, the high degree of university autonomy from the ministry of education, and a tradition of responding to student demand, especially in relatively low cost instructional areas.

Universities are conservative institutions, which are slow to change in part because faculty are tenured in highly specialized areas. Reducing enrollments in any given field may mean underemploying tenured faculty, who typically cannot be used as faculty in those fields where expansion is desired. One might thus expect greater flexibility in reallocating resources in those institutions, often private, which have low proportions of full-time tenured faculty. Introduction of new fields or expansion of fields where social returns are high is often made more difficult by university-wide pay scales which do not permit the university to successfully compete with other employers for faculty with specialized technical skills.

The public university, unlike the private one, also lacks strong incentives to respond to market signals regarding university graduates. University autonomy often means universities receive their funding in terms of block grants not tied to any particular university programs or activities, although there is some evidence that funding is highly correlated with enrollment levels.[43] The public university thus need not respond to market signals in order to receive funding, and it has some incentive to accomodate enrollment growth by expanding offerings in low-cost rather than high-cost fields. If universities are rewarded for increasing enrollments but not rewarded for expanding the size of high-cost programs, there is some incentive for administrators to expand enrollments in low- cost programs in order to generate "slack" or internal profit which can be designated for the programs they view as having highest priority.

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42/ The director general for higher education for Mexico, for example, has lamented the continued high percentage of students enrolled in traditional occupations like law and accounting and argued for the need to expand offerings in fields like electrical engineering and computer science.

43/ Mexico's UNAM, for example, has enough political influence that it can largely bypass ministry budgetary procedures and deal directly with higher level authorities in arriving at a budget for the university (Levy, 1985).

Why don't larger numbers of students enroll in fields having high private rates of return? Evidence on the ratio of applicants to positions in different fields suggests that in part they face supply constraints on the part of the university. However, even when not faced with such constraints, students often select a traditional field like law over technical areas where salaries are higher. One argument given to explain this phenomenon is that students make career choices on the basis of expected incomes for individuals successfully employed in a field, thereby ignoring unemployment or underemployment in their selected field. An additional explanation is that few students enter the university prepared to study in technical areas.

## F. Policy Choices

A variety of policy choices are available to improve external efficiency in higher education. The political and administrative feasibility of adopting and implementing these choices varies, of course, by country.

The first problem in external efficiency identified here is overinvestment in higher education relative to primary education and insufficiently high returns to higher education investments (in the form of enrollment expansions) generally. The policy choices available to treat this problem include the following:

1. Reallocate educational resources from higher education to other educational levels. Funding levels for higher education have been greatly reduced in many countries in recent years but not as the result of conscious decisions to reallocate more resources to other educational levels. Explicit reallocation decisions would require that some government agency (perhaps the finance or planning ministry) adopt a systemwide view of educational investment. As noted above, there are a number of institutional and political constraints to effectively implementing such a view.

2. Reallocate educational resources within higher education so as to raise the overall social rate of return. There is ample evidence that the overall social return to investment in higher education has decreased with the very large enrollment expansions over the past two decades. The evidence argues for limiting further growth in public sector enrollments in most countries. However, some additional investment may be warranted to improve instructional quality in both public and private institutions. Furthermore, more detailed analysis of the costs and benefits of different higher education institutions might determine that further investment to expand enrollments is warranted in some institutions, such as expanding distance learning, introducing low cost public community colleges, or providing selective subventions to some private higher education institutions.

The second problem in external efficiency discussed above is variation in rates of return across fields within the university and the continuing mismatch between the skill mix produced by the university and the set of labor skills demanded by employers. Several policy choices could help to alter the instructional mix offered by the university and the fields selected by students:

1. Establish budgetary incentives to improving the instructional mix of the university. Within the constraints noted above, universities already have the ability to reallocate resources across fields. Incentives to universities to alter their instructional mix could take the form of varying subventions per student depending on costs of instruction by field and the social rate of return by field; in addition, univerities might be required to provide detailed cost and enrollment information by instructional area in their budget requests. In many countries, establishment and enforcement of such incentives by the funding authorities, the education or finance ministries, could be viewed as impinging on university autonomy.[44] One possible solution, exemplified by Mexico's regional technical institutes, is to develop new institutions more closely tied to government policy. Improvement of the instructional mix in some cases requires expansion or development of programs where labor costs are unusually high (e.g., computer science, electrical engineering); a different salary scale for such areas may be required to successfully attract high quality faculty.

2. Introduce more flexible academic programs and curricula that allow students in the university to more easily switch fields. One continues to find both traditional faculties and modern departmental structures in Latin American universities. Student applicants are often admitted to a particular faculty or department upon beginning university work rather than allowing students to pursue general studies initially and choose a field of specialization later. Permitting later specialization would provide a better match between a student's abilities and his field of choice and enable students to acquire better information on earnings and employment prospects prior to commiting themselves to a particular field.

3. Customarily undertake tracer studies of the graduates of specific programs and universities to develop more detailed information on earnings and employment of graduates. Information to date on earnings and returns to specialized fields is available and analyzed only at the national or regional level. As shown in the case of Peru (Carnoy, 1978), earnings vary by the type of university attended, and social rates of return are likely to vary as well. Tracer studies would both provide more information to students in selecting fields and institutions and more information to funding authorities making decisions about where to expand or contract particular instructional programs.

4. Provide current information to students on the earnings and employment opportunities by field as well as type of institution. In a rapidly changing labor market, students may make erroneous career choices on the basis of hearsay and historical information. Provision of current information on earnings, employment rates, and employment opportunities by field would help improve career choice. In addition, if available by institution or institutional type (public, private, polytechnic, etc.) such information would also aid in student choice.

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44/ The past decade has seen requirements for much more detailed budget requests in several developed countries, including the United Kingdom and some states in the U.S.

# IV. EQUITY

## A. Introduction

Equity in higher education refers to the degree of access to higher education by various groups in society and the effects of higher education on income distribution and social mobility. As noted earlier (Tables I.1 and I.2), overall access to higher education in Latin America has improved greatly over the past couple of decades. The proportion of the age group enrolled in higher education doubled in the decade 1960 - 1970 and again more than doubled in the decade 1970 - 1980. Access to higher education is considerably higher than that found in most other developing regions of the world.

In spite of the incredible growth in higher education enrollments in Latin America, demand has grown even more rapidly. Table IV.2 reveals the ratio of applications to admissions has increased over time in Colombia and Chile in spite of large increases in higher education supply. Countries having open- admission policies (e.g., Argentina, Ecuador, Peru) have ratios close to 1.0, but in those countries the first year of college becomes a mechanism to screen individuals for continuing higher education studies; the relevant measure of access thus becomes the ratio of second year students to entering first year students.

## Table IV.1

## Access to Higher Education, Selected Countries*
(percentages)

| Country | Secondary Enrollment/ Population Age Group | University Enrollment/ Secondary Enrollment | University Graduates/ University Enrollments | University Enrollment Population Age Group |
|---|---|---|---|---|
| Argentina | | | | |
| 1960 | 34.12 | 31.43 | 5.38 | 11.0 |
| 1970 | 46.45 | 28.17 | 8.74 | 13.8 |
| 1980 | 58.52 | 35.97 | | 21.6 |
| 1985 | 73.50 | 47.01 | | 36.4 |
| Brazil | | | | |
| 1960 | 16.48 | 8.13 | 18.37 | 1.6 |
| 1970 | 39.83 | 10.54 | 14.88 | 5.3 |
| 1980 | 20.50 | 49.99 | 16.61 | 11.9 |
| 1985 | 21.20 | 50.12 | 17.14 | 11.3 |
| Chile | | | | |
| 1960 | 31.52 | 11.14 | 8.55 | 4.0 |
| 1970 | 33.07 | 25.96 | 10.53 | 9.3 |
| 1980 | 44.82 | 27.03 | 10.81 | 13.0 |
| 1985 | 57.62 | 29.49 | 10.29 | 15.8 |
| Colombia | | | | |
| 1960 | 13.77 | 9.32 | 8.42 | 1.8 |
| 1970 | 27.87 | 11.57 | 8.71 | 4.8 |
| 1980 | 55.80 | 15.67 | 10.52 | 10.6 |
| 1985 | 58.87 | 20.24 | 12.45 | 13.0 |
| Mexico | | | | |
| 1960 | 14.49 | 15.34 | 21.32 | 2.6 |
| 1970 | 29.36 | 16.69 | 3.83 | 5.8 |
| 1980 | 61.90 | 18.93 | 7.75 | 14.1 |
| 1985 | 72.53 | 18.44 | 9.36 | 16.0 |
| Venezuela | | | | |
| 1960 | 26.58 | 14.66 | 10.69 | 4.0 |
| 1970 | 41.55 | 19.88 | 4.89 | 10.9 |
| 1980 | 48.40 | 36.11 | 5.15 | 21.4 |
| 1985 | 55.48 | 42.69 | 5.62 | 26.4 |

Sources: Unesco Statistical Yearbook, 1964; 1972; 1973; 1974; 1983; 1984; 1987.
UN Demographic Yearbook, Historical Supplement, 1979.
World Bank, World Population Projections, 1987/88.
Also, see Annex I.1.

### Table IV.2

### Ratio of Applicants to Students Admitted in First Year of University
(public and private)
(no. applicants/no. admitted)

| Year | Colombia | Chile | Ecuador | Costa Rica |
|---|---|---|---|---|
| 1966 | 1.6 | | 1.5 | |
| 1967 | | | 1.4 | |
| 1973 | 2.2 | 2.5 | 1.0 | |
| 1974 | | 3.0 | | |
| 1975 | | 3.5 | | |
| 1980 | | 3.6 | | 3.7 |
| 1981 | | 3.7 | | |
| 1982 | 3.0 | | | |
| 1983 | 3.0 | | | |

Source: Schiefelbien and de Acuna (1984), Table 5.

Furthermore, in spite of enrollment growth, not all groups have equal access to higher education. In particular, access tends to vary depending on family income, parental education, sex, and urban/rural location. Unequal access is not only important in and of itself but has important consequences for economic productivity, social mobility, and regional development. Unequal access is the first problem discussed in this section.

The second problem discussed here is a result of the methods by which higher education is financed in Latin America. Public higher education is typically (not always) fully funded by the state. Unequal access to public higher education is thus translated into unequal government subventions by income class. The result can be a worsened distribution of income. This is certainly not a problem unique to Latin America, but it is nonetheless an undesireable consequence of an educational system popularly perceived as benefiting lower income groups.[45]

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[45] For example, in a classic article, Hansen and Weisbrod (1972) found the same to be true of public higher education in the state of California.

## B. Unequal Access

The access a young person has to higher education depends on the occupational status of the family head as well as the individual's ability. This is clearly demonstrated in Table IV.3. Children of families where the head of household's occupation is manual work or trading represent a smaller proportion of higher education enrollments than they do of primary school enrollments in Latin America. Children of white collar families on the other hand represent only 17% of primary school enrollments but constitute 45% of higher education enrollments. The overrepresentation (i.e., ratio of higher education share to population share) of high socioeconomic family status children is larger in Latin America than it is in Asia, the Middle East, or OECD countries. Surprisingly, the high level of access to higher education in Latin America generally has not resulted in greater equity than is found in Francophone Africa, where access is much more limited.

### Table IV.3

### The Distribution of Enrollments and Population by Socioeconomic Status, Major World Regions

| Region/<br>Socioeconomic Status | Percent of Enrollments<br>Primary | <br>Secondary | <br>Higher | Percent of Total Population a/ | Ratio of Higher Educ. Share to Population Share b/ |
|---|---|---|---|---|---|
| **Latin America** | | | | | |
| Farmers | 31 | 12 | 10 | 36 | 0.3 |
| Manual Workers & Traders | 52 | 54 | 45 | 49 | 0.9 |
| White Collar | 17 | 34 | 45 | 15 | 3.0 |
| Total | 100 | 100 | 100 | 100 | |
| **Francophone Africa** | | | | | |
| Farmers | 61 | 36 | 39 | 76 | 0.5 |
| Manual Workers & Traders | 26 | 27 | 21 | 18 | 1.2 |
| White Collar | 13 | 37 | 40 | 6 | 6.7 |
| Total | 100 | 100 | 100 | 100 | |
| **Asia** | | | | | |
| Farmers | 53 | 25 | 19 | 58 | 0.3 |
| Manual Workers & Traders | 34 | 43 | 38 | 32 | 1.2 |
| White Collar | 13 | 32 | 43 | 10 | 4.3 |
| Total | 100 | 100 | 100 | 100 | |
| **Middle East & North Africa** | | | | | |
| Farmers | 39 | 15 | 22 | 42 | 0.5 |
| Manual Workers & Traders | 49 | 57 | 31 | 48 | 0.6 |
| White Collar | 12 | 28 | 47 | 10 | 4.7 |
| Total | 100 | 100 | 100 | 100 | |
| **OECD** | | | | | |
| Farmers | 12 | 11 | 11 | 12 | 0.9 |
| Manual Workers & Traders | 53 | 45 | 32 | 53 | 0.6 |
| White Collar | 35 | 44 | 57 | 35 | 1.6 |
| Total | 100 | 100 | 100 | 100 | |

Source: Adapted from Mingat and Tan (1986).

a/ The total population figures refer to the population of parents with school-age children.

b/ The value 1.0 shows equality between population share and enrollment share for a given group. Values below suggest discrimination against the group. Values above 1.0 show over-representation of the group in enrollments.

Studies of specific Latin American countries corroborate the aggregate findings given in Table IV.3. For example, 61.3% of students admitted to Colombian universities in 1981 were from the top 40% of families in terms of household income, while only 3.4% of students came from the bottom quintile of the income distribution.[46] Furthermore, the distribution of students by family income status tends to vary with type of institution. In Colombia a higher proportion (70.1%) of students in private institutions of higher education come from the top two quintiles of the distribution than is true for public institutions (53.0%). The same pattern is found to be true in a survey of Mexican institutions of higher education. Table IV.4 shows a private institution has much higher representation of high income and a much lower representation of low income students than do public institutions. In addition, the mix of students by income class varies by type of institution. Relative to other institutions, a technical institute has lower representation of high income students and higher representation of middle income students.[47]

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46/ Jimenez and Tan (1987).

47/ Jimenez and Tan (1987) did not find the same to be true in Colombia where enrollment in technical institutions is more heavily weighted (64.5%) to the top two quintiles of the income distribution than is true for enrollment in the universities.

Table IV.4

Indexes of Inequality by Institutional Type in Mexico, 1976

| Institution | Index of Inequality by Family Income | | |
|---|---|---|---|
| | High | Middle | Low |
| Comprehensive Public (UANL) | 6.54 | 10.20 | 0.85 |
| Comprehensive Public (UAA) | 15.09 | 28.62 | 0.65 |
| Normal, State (NENL) | 9.52 | 12.58 | 0.61 |
| Private Comprehensive (UCEM) | 57.21 | 12.62 | 0.09 |
| Technical Federal (ITRA) | 2.81 | 15.32 | 0.85 |

Note: The index of inequality represents the percent of students in the income class in the institution divided by the percent of families in the income class in Mexico.

Source: Adapted from Quintero (1978).

There is also a strong relationship between access to higher education and parental educational status. Table IV.5, for example, demonstrates how the probability of admission to the University of Costa Rica varies directly with educational status of the father. While only 15.3% of applicants whose fathers had no formal education were admitted, 46.8% of applicants whose fathers had some graduate level education were admitted.

Table IV.5

Probability of Success in Entering the University
by Father's Education Level, Costa Rica, 1981

| Father's Education Level | Number Taking Entrance Test | Number Admitted | Percent Success Rate |
|---|---|---|---|
| None | 649 | 99 | 15.3 |
| Primary Incomplete | 7,034 | 1,311 | 18.6 |
| Primary Complete | 5,004 | 1,122 | 22.4 |
| Secondary Incomplete | 2,616 | 755 | 28.9 |
| Secondary Complete | 1,520 | 450 | 29.6 |
| University Incomplete | 986 | 348 | 35.3 |
| University Complete | 1,295 | 549 | 42.2 |
| Graduate level | 361 | 169 | 46.8 |
| Total | 22,495 | 5,922 | 26.5 |

Source: Schiefelbein and de Acuna (1984), Table 6.

Unequal participation in higher education between men and women is rapidly disappearing in Latin America, but differences still remain, especially when comparing fields of specialization. For example, in Argentina in 1983 there were more (54%) female than male students in the higher education system, an increase from 38% female in 1963.[48] Similarly, in Brazil the percentage of female students in the higher education system increased from 30% in 1965 to 38% in 1970 and 49% in 1982.[49]

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[48] Cano (1985), p. 132.

[49] Pontes (1985), p. 40.

The proportion female varies by type of institution. For example, in Argentina the proportion female in the university system (44%) is lower than that in the higher education system as a whole, while on the other hand, in Venezuela the proportion female in universities (59%) is slightly higher than that in the higher education system as a whole (57%).[50]

While overall female participation in higher education is approximately the same as that for males, significant differences persist across fields of specialization. In Chile, for example, a recent study showed only 6% of engineering students were female compared with 61% of education students and 90% of nursing students.[51] In Venezuela, females constitute 30% of enrollments in engineering, architecture and technology, 72% of enrollments in the health sciences and 79% of enrollments in education.[52] Finally, in Mexico, females represent 15% of enrollments in engineering and technology compared with 57% of enrollments in education and humanities.[53] Comparing the percentage female and expected incomes by field, one finds an inverse correlation.

Young adults living in major metropolitan areas tend to have greater access to higher education than do individuals living elsewhere. In Argentina, for example, 55.7% of total enrollments and 63.2% of private institution enrollments are in greater Buenos Aires.[54] In Colombia, 41% of students are in Bogota, compared with 20% of the population.[55] Finally, a recent World Bank study finds 59% of total Peruvian higher education enrollments are in Lima, compared with 35% of the total population; taking private higher education alone, 88% of enrollments are in Lima.

## Causes of Unequal Access

The causes of unequal access by children of families having low socioeconomic status (either family income or parental education) are (i) high private costs of higher education and inadequate financing mechanisms, (ii) low quality public primary and secondary education and, consequently,

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50/ Silva G., et. al. (1985), Table 38.

51/ See annex IV.2.

52/ Silva G., et. al. (1985), Table 13.

53/ Ibarrola (1986), p. 44.

54/ Cano (1985), p. 130.

55/ Arias, et. al (1985).

low performance on entrance examinations, (iii) limited supply of higher education at times convenient to working individuals, and (iv) lack of knowledge of how to apply for admission.

While public higher education is generally "free" in Latin America, the private cost, including opportunity cost and direct outlays on instructional materials, can be sufficiently onerous to deter lower income students from enrolling. Part time campus employment to help defray such costs is generally unavailable, financial aid in the form of grants and scholarships is extremely limited, and student loans, when available, are sometimes limited to financing tuition payments only and often require collateral guarantees, thereby limiting access by students from low income groups.[56]

Another factor affecting access is quality of primary and secondary education. Higher income families frequently send their children to private primary and secondary schools as preparation for higher education, traditionally public universities.[57] In Colombia, for example, more than 60% of the students enrolling in the prestigious Universidad Nacional have had both private primary and private secondary education.[58] Lower income families, of course, are typically unable to afford private schooling and thus suffer from the various problems found in the public schools, resulting in lower scores on university entrance examinations. The inverse correlation between socioeconomic status and performance on such examinations is well-documented. This inverse correlation also means that, if admitted to the university, students from low socioeconomic backgrounds are less likely than other students to gain access to the most prestigious and highest paying fields, which often impose the most demanding entrance requirements.[59]

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56/ For example, in Brazil, student loans have usually been available only to cover tuition payments; as a consequence it has been in effect a means of financing (and to some extent subsidizing) private higher education.

57/ As Enrollments in traditionally elite public universities (e.g., San Marcos University in Lima) have risen, the quality of that education has diminished. Hence, to some extent the traditional pattern is being disrupted, and higher income families are now more likely to send their children to private universities, too. In other countries (e.g., Brazil and Colombia) where massification of the public university has not occurred, the traditional pattern still holds.

58/ Levy (1986), p. 39.

59/ See Annex IV.2 for an example of how minimum entrance examination scores vary by field of study.

Limited access to secondary education is another factor which in turn limits access by children of low income families to higher education. Table IV.3 demonstrates that children of farmers, for example, represent 31% of primary school, 12% of secondary school, and 10% of higher education enrollments. Lack of access to secondary education is a much more serious constraint to higher education than any other factor for children from families of low socioeconomic status.

Due to the lack of financial aid, qualified individuals from lower income backgrounds must often work and attempt to attend school part-time. Ironically, it is the fee-charging private institutions which have responded to this demand by offering courses at times convenient to working students. Public institutions (e.g., the federal universities in Brazil) have often failed to respond similarly, in part due to the lack of willingness on the part of faculty to teach evening courses.

Finally, as shown in a study of the admission process at the Universidad de Costa Rica, students from lower income backgrounds frequently either find it difficult to acquire the proper documentation for admission or do not know how to carry through all the stages of the admission process.[60]

Unequal access by geographic region, especially major metropolitan areas vs. the rest of the country, is partly the result of historical factors which led to the founding of universities in the first place, and, as noted earlier, many of Latin America's most prestigious public universities are hundreds of years old. In addition, private higher education has tended to be even more spatially concentrated than the public system. The reasons private institutions locate where they do have not been studied, but their concentration in major urban areas is likely to be a result of both demand and supply considerations. Many private institutions are specialized rather than comprehensive in nature, and major urban areas have sufficient demand to warrant specialized institutions. On the supply side, high proportions of private university teachers simultaneously hold permanent faculty positions in the public institutions. Hence, the prior existence of public institutions in a geographic area may imply lower costs to the private institution for faculty of a given quality.

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60/ Schiefelbein and de Acuna (1984).

### Consequences of Unequal Access

The consequences of unequal access by individuals from families of low socioeconomic status are lost economic productivity, lower social mobility, and, as will be shown later, unequal distribution of higher education subventions. As shown by Pinera and Selowsky (1981), if ability and education complement each other in determining an individual's productivity, limits to access on the basis of socioeconomic status reduce the ability levels of matriculated students and thereby also reduce the returns to higher education. A study by Jimenez and Tan (1987) of admissions to Colombian higher education demonstrated that if student access to higher education were solely determined by ability, the proportion of higher education students from lower income groups would increase while the proportion from higher income groups would decrease. Thus, instituting admission mechanisms and accompanying financial aid to assure access on the basis of ability would simultaneously improve external efficiency and equity in higher education.

Students from lower socioeconomic backgrounds are less likely to have access to the quality of primary and secondary education required for successful admission to higher education institutions, or, in those universities having open admissions policies, successful completion of the first year of study. In addition, even should they have the necessary qualifications for admission the lack of scholarships and loans to finance the private costs of education may force them to not enroll. Finally, should they enroll, their lower secondary school achievement deters their access to the most remunerative and prestigious fields. Taken together, these factors serve to seriously limit social mobility, in spite of a policy of "free" public higher education.

One final consequence of unequal access merits mention. Several countries have regional development programs, yet concentration of universities and students in the major metropolitan areas may be in conflict with those programs. There are good historical reasons for the location of universities, and urban locations are often more conducive to attracting good faculty and providing some of the intellectual interchange necessary for scholarship. But requiring students to move to the largest urban areas for higher education continues to drain human capital from the outlying regions to the centers to the disadvantage of regional development.

### C. Distribution of Subventions and Incomes

Total public sector subventions to higher education are equal to total direct outlays on higher education plus the imputed rental value of capital facilities plus tax expenditures associated with higher education. The latter include exemptions to colleges and universities from payment of taxes, reduced business or personal tax payments associated with tax deductible contributions and tuition payments, and the true cost of student loan programs.[61] In principle, the distribution of total subventions by socioeconomic groups in society can be determined by (i) observing the distribution of enrollments by socioeconomic group, field of study, and institutional type, (ii) calculating public sector subventions by field of study and institutional type, and (iii) multiplying enrollment distributions by subventions per student.

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[61] The true cost of students loans is the difference between loan disbursements and the expected present value of repayment.

A recently completed study simplified this procedure somewhat by ignoring tax expenditures and considering only the distributions of enrollments by income groups for public institutions taken as a whole and private institutions taken as a whole.[62] The results of that study are given in Table IV.6. They demonstrate that higher education subsidies are most equally distributed in Argentina (where the lowest quintile receives 8.3% of total subsidies) and least equally distributed in the Dominican Republic (where the lowest quintile receives a zero share of total subsidies).[63] The results are summarized in the Gini coefficient computed for the subsidies; the Dominican Republic has the highest Gini (0.667), indicating the greatest degree of inequality, while Argentina has the lowest Gini (0.310).[64]

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62/ Petrei (1987).

63/ For purposes of comparison, a recent World Bank (1986) study found the bottom income decline in Brazil received 1.1% and the top two declines received 48.3% of higher education subsidies; their respective shares of aggregate personal income are 1.1% and 59.3%.

64/ These results occur in spite of the fact that Argentina has a much higher proportion (30.7%) of students in private secondary education than the Dominican Republic (22%), while the Dominican Republic has a much higher proportion (39%) of students in private higher education than does Argentina (20.9%) (Petrei, p. 75).

## Table IV.6

## Share of Higher Education Subsidies Received by Different Income Groups

| Quintile | Argentina | Costa Rica | Chile | Dominican Republic | Uruguay |
|---|---|---|---|---|---|
| First | 8.3 | 4.1 | 5.5 | 0.0 | 7.2 |
| (First Decile) | | (1.7) | (1.6) | | (3.5) |
| Second | 9.1 | 13.3 | 6.7 | 2.3 | 6.7 |
| Third | 17.5 | 10.6 | 14.4 | 4.0 | 17.2 |
| Fourth | 27.1 | 30.3 | 19.6 | 18.1 | 34.8 |
| Fifth | 38.1 | 41.7 | 53.7 | 75.6 | 34.1 |
| (Last Decile) | | (17.4) | (29.7) | | (24.8) |
| Higher Education Subsidy Gini | 0.310 | 0.369 | 0.437 | 0.667 | 0.328 |
| Secondary Education Subsidy Gini | -0.114 | -0.074 | -0.124 | 0.243 | -0.112 |
| Primary Education Subsidy Gini | -0.303 | -0.282 | -0.316 | -0.085 | -0.375 |
| Income Gini | 0.322 | 0.368 | 0.506 | 0.423 | 0.345 |

Source: Petrei, (1987)

Notes: Subsidies include both recurrent expenditures and the inputed rental value of capital.

The subsidy Gini can be compared with the Gini coefficient computed for the distribution of income to see how higher education subsidies affect the degree of equality in the distribution of income inclusive of the higher education subsidy. For three countries--Argentina, Costa Rica, and Uruguay--the subsidy Gini is approximately equal to the income Gini, implying the higher education subsidy has little impact on the degree of equality in the distribution of income plus the subsidy. In Chile the subsidy Gini is lower than the income Gini, suggesting higher education subsidies have a mild equalizing effect, while in the Dominican Republic the subsidy Gini is substantially larger than the income Gini, implying higher education subsidies have an unequalizing impact on the distribution of income plus subsidy.

## Causes and Consequences of Subsidies

The distribution of higher education subsidies is a direct result of who attends and who pays for higher education. The higher education participation rate varies directly with family income, resulting in larger subsidies per family among higher than lower socioeconomic groups. Furthermore, uniform pricing policies combined with very limited financial aid means students from low and high income families tend to pay the same amount for tuition and fees within public institutions or within private institutions.

To determine the overall impact of the finance and subsidies of higher education, the impact of tax payments should also be included in a measure of net income (equal to gross income plus the higher education subsidy minus the higher education tax payment) for each quintile in the analysis reported above. If the tax burden is roughly proportional to income, one could conclude, at least for Argentina, Costa Rica, and Uruguay, that the higher education system has little impact on net income. If the tax structure is regressive with respect to income, the higher education system probably makes the distribution of net income less equal.

## D. Policy Choices

The equity effects of higher education in Latin America could be improved by adopting a variety of policy choices. Most policies to be considered would simultaneously improve both equality of access and equity in subventions to higher education.

1. Increase financial aid in the form of scholarships and grants to qualified potential students from low socioeconomic backgrounds. Financial aid to potential students from low income families would help reduce the private costs associated with higher education and thereby increase the probability of their attending college full-time.[65]

In the case of public institutions charging zero tuition, financial aid would be limited to covering some portion of living costs, books, and supplies. In the case of private institutions meeting accreditation standards, financial aid would again be income contingent but cover tuition in addition to other private costs. Financial aid could take the form of grants, scholarships, subsidized loans (effectively part grants) and non-subsidized loans. In terms of equity effects, there is no reason why financial aid should be limited to low income students attending public institutions. Furthermore, to improve access by students in regions where higher education opportunities are low, financial aid might also partly cover transportation costs.

In addition to improving access, increased financial aid to low income students would directly increase their level of higher education subventions and thereby improve equity in the distribution of subventions.

2. Improve the quality of and access to primary and secondary education. A far more important deterrent to access than the private costs of higher education is the limited access to and quality of secondary education. Indeed, reallocation of public expenditures from higher education (meaning reduced enrollments) to expanding access to secondary education might have the net effect of improving access to higher education by children of low income families.

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[65] Jimenez and Tan (1987) demonstrate for the case of Colombia that eliminating financial barriers to enrollment such that admissions were determined solely on the basis of ability would significantly increase the proportion of students from the bottom two quintiles of the income distribution both in public and private institutions, thereby also improving equity in the distribution of subsidies.

Improving access to and quality of secondary education would only indirectly, via increased higher education participation rates, improve equity in the distribution of higher education subventions. But in a broader sense, increasing expenditures to broaden access and improve quality in secondary (and possibly primary) education would significantly improve overall equity as measured by income plus educational subventions. As shown in Table IV.6, the subsidy Gini for primary and secondary education is consistently negative (excepting secondary education in the Dominican Republic), demonstrating that these levels of education are redistributive from rich to poor.

3. Introduce income-contingent pricing of public higher education. Proposals to significantly raise tuition levels in public institutions are controversial in any country. However, the low political feasibility of a policy choice is no reason to ignore it. Income-contingent fees for public higher education would directly reduce the level of subventions received by high income groups and improve equity in the distribution of such subventions.[66] Furthermore, in the ideal world introduction of fees would be accompanied by financial aid to lower-income students, to cover some portion of their private costs of higher education (inclusive of the fee, should uniform fee levels be set for the institution).

4. Adapt university teaching schedules to the needs of working students. Perhaps the least cost and least controversial means of improving access to higher education is to either modify teaching schedules (e.g., night and weekend classes) of traditional universities or to introduce non-traditional universities (e.g., distance learning) with flexible teaching and learning schedules. Ironically, private universities usually do a better job at meeting needs of workers than do public universities. Hence, yet a third option is for government to offer direct tuition subsidies to low income workers (who could not otherwise afford the fees) to attend such institutions.

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66/ It makes no difference if income contingent fees take the form of fee levels which vary with the income status of the student, or if uniform fee levels are established accompanied by financial aid, the size of which is determined by student income status. The latter is the more likely, but the effect is the same.

# V. FINANCE

## A. Introduction

The rationale for government finance of higher education lies with the social benefits generated by higher education activities--instruction, research, and public service. Each of these activities can be viewed as generating both pecuniary and nonpecuniary benefits to society. An important pecuniary benefit is increased productivity of both labor and physical capital. Instruction, for example, leads to both direct (increases in skills and labor productivity) and indirect (complementarity between human and physical capital) increases in productivity.[67] An example of a nonpecuniary benefit is the possible contribution of higher education to social mobility and a more equitable income distribution.

The existence of social benefits does not in and of itself justify public subventions of higher education. If the private benefits are sufficiently large to bring about sizeable private investments in higher education, the required role of government may be small. Private benefits are likely to be highest for instruction and applied research and development and smallest for basic research. Of course, enhancing social mobility and improving income distribution are activities not typically undertaken privately.

The implication of this analysis is that government needs to play an important role in financing basic research, including research-related graduate education, and financing policies (e.g., student loans, need-based scholarships) to improve social equity, while paying somewhat less attention to financing instruction, including professional graduate education.

The fact that government financing is required to bring about optimal levels of social investments in higher education implies nothing about how higher education services should be provided. Social objectives regarding efficiency and equity can be provided by influencing the behavior of private institutions, by directly providing higher education via public institutions, or some mix of the two. In Latin America, most countries exhibit a mix of public and private institutions of higher education, but government policy (and finance) sometimes reluctantly considers private institutions as in fact performing a public purpose.

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67/ Numerous approaches have been used to demonstrate the relationship between education and economic growth, including growth accounting (e.g., Denison, 1962), estimation of rates of return to human capital (e.g., Schultz, 1963), and estimation of aggregate production functions (e.g., Hicks, 1980). Other research has shown the complementarity between human and physical capital (e.g., Jamison and Lau, 1982). Only the rate of return approach has attempted to identify the specific contribution of higher education.

### Problems in Finance

This section identifies several problems confronting higher education finance in Latin America. These problems include:

1. Government expenditures on higher education will be constrained in the near future. Enrollments in public higher education have increased more rapidly than expenditures in recent years, resulting in lower quality instruction and research. The constraint on expenditures is likely to persist, suggesting governments need to find more cost-effective means of accomplishing their higher education objectives.

2. Higher education institutions are excessively dependent on single sources of revenues. Public institutions depend almost solely on government subsidies, while private institutions depend on tuition revenues. Economic criteria of efficiency and equity argue for more diverse sources of revenues.

3. Both public and private institutions have limited capacity to finance construction of new facilities. Difficulties in financing capital facilities both limit expansion by private institutions and increase politicization in the allocation of government construction funds.

4. University budgets are determined in the absence of clear performance criteria. Politics and negotiation always play an important role in budgeting, but the absence of explicit performance criteria to guide budgetary allocations results in lower cost-effectiveness in the use of public funds.

## B. Higher Education Expenditures

Society's expenditures on higher education equal public plus private outlays in both public and private institutions; public outlays, of course, are primarily concentrated in public institutions. As was shown in Table I.5, real public expenditures increased signicantly between 1970 and 1980 only to subsequently decline, especially in per student terms. No comparable data exist on private outlays, either in terms of opportunity costs or tuition payments to private institutions, but considering the fact that more than one-third of higher education students in Latin America attend private institutions, total private outlays are substantial, possibly equaling or exceeding government expenditures.

Table V.1

Projections of Higher Education Enrollments and Expenditures for Latin America (millions of 1980 US dollars)

| | Actual | | | Projected |
|---|---|---|---|---|
| | 1970 | 1980 | 1985 | 2000 |
| Secondary Education Enrollments | 9,859 | 15,636 | 18,667 | |
| Assuming Constant Participation Rate of 15-19 Age Group | | | | 23,604 |
| Assuming 1.5 Percent Annual Growth in Participation Rate | | | | 29,638 |
| Size of 20-24 Year Old Age Group | 24,034 | 33,705 | 39,173 | 48,878 |
| Higher Education Enrollments | 1,640 | 4,852 | 6,416 | |
| Assuming Constant Participation Rates of 20-24 Age Group at 1985 Levels (AI) | | | | 8,006 |
| Assuming Constant Ratio of Higher to Secondary Enrollments(AII) | | | | 9,692 |
| Real Higher Education Expenditures (percentage change from 1985) | 11,898 | 33,051 | 25,343 | |
| Assuming Constant Unit Costs at 1980 Levels | | | | |
| AI | | | | 54,535<br>(115%) |
| AII | | | | 66,020<br>(161%) |
| Assuming Constant Unit Costs at 1985 levels | | | | |
| AI | | | | 31,624<br>(25%) |
| AII | | | | 38,284<br>(51%) |

Note: AI assumes a constant participation rate of the 20-24 year old age group in higher education, which implicitly assumes constant participation rates in secondary education and a constant ratio of higher to secondary enrollments; AII assumes a 1.5 percent annual growth rate in the participation rate at the secondary level and a constant ratio of higher to secondary enrollments. See Annex V.1 for details.

Future changes in government higher education expenditures will, of course, depend on both enrollment demand and overall government budget constraints. Table V.1 demonstrates that the demographic determinants of demand--the size of the college- eligible population--will continue to grow. Not only will the size of the 20 - 24 year old age group grow, but the number of secondary school students and graduates will grow even more rapidly. And historically the percentage of secondary school graduates continuing on to the first year of university education has been high in Latin America (estimated at 80% in Mexico and 52% in Uruguay).

If government spending rises in proportion to enrollment growth, it is expected to increase by 51% by the year 2000. Spending per pupil, however, has decreased since 1980; if spending per pupil were increased in real terms to their 1980 levels, government spending as a result of both enrollment growth and quality improvements would increase by 161% by 2000.

Several factors shed doubt on these projections: (i) overall government budgets may be constrained sufficiently to not permit growth in higher education expenditures; (ii) increased competition for funding both from inside and outside the education sector may further reduce the proportion of the government budget allocated to higher education; (iii) the conversion rate between secondary and higher education may decrease if additional secondary school graduates have lower academic abilities; (iv) higher education participation rates may decline in response to declining private rates of return; and (v) demand for higher education may decline if quality in or access to the public system declines and more potential students are confronted with paying tuition in private institutions.

Argentina provides an example of how the enrollment projections given in Table V.1 may be underestimated. Higher education enrollments grew rapidly in the period 1970 - 1985 in spite of an already high participation rate and a low growth rate of population. Furthermore, this occurred with only a slight increase in the ratio of higher to secondary education enrollments between 1970 (0.26) and 1980 (0.29). The major cause of higher education enrollment growth appears to be the 39.4% increase in secondary education enrollments between 1970 and 1980. The Argentine example suggests that should public funding be available to provide the supply, enrollments and expenditures may exceed those projected in Table V.1.

In addition to growth in the college-eligible population, enrollment growth is also explained by changes in supply. In some countries (e.g., Argentina, Peru) the operative public policy regarding supply has been to meet demand at a zero price.[68] In other countries (e.g., Brazil, Chile) operative public policy has put greater emphasis on maintaining quality standards in public institutions and relying on private universities to supply lower quality instructional services. Under either policy type, there is often pressure to establish new universities, especially in geographic areas not currently served. In federal systems

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68/ Spending constraints, however, have typically resulted in increased supply of lower quality instructional services, thereby forcing students interested in higher quality instruction to seek out private alternatives.

like Brazil and Mexico the states can establish new universities and later seek means of funding them. Simultaneously while facing tight education budget constraints in 1987, ten states in Brazil took steps to establish new universities.[69]

## C. Sources of Higher Education Finance

The sources of higher education finance vary by country, public/private sector, nature of the institution (university, polytechnic, etc.), type of expenditure (recurrent, capital) and activity (instruction, research). An example of the variety of patterns found in Latin America is summarized in Table V.2. All activities in public institutions are overwhelmingly financed by government. Instructional activities in private institutions, on the other hand, are mostly financed privately through tuition revenues. The sources of finance of private institutions vary somewhat by activity. In Chile government makes little distinction between public and older private institutions in allocating its subsidies.[70] In Mexico private institutions receive few public funds for any of their activities. And in Brazil undergraduate instruction in private institutions is largely funded through tuition, but research and graduate education is largely funded through the federal government.[71]

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69/ While the federal government has issued several decrees prohibiting the establishment of new universities and new courses, for a variety of reasons the decrees have little effect on university expansion (Instituto de Planejamento Economico e Social, 1987).

70/ Newer private institutions, on the other hand, are in general not eligible to receive public funding for instructional activities.

71/ The situation in Brazil is complex with the public federal universities fully funded by the federal government, instructional activities in the public state universities funded by the state governments, and instructional activities in the public municipal universities partly funded through tuition. In addition, the federal government's student loan program has at times effectively served as federal vouchers to cover tuition payments in the private sector.

Table V.2

Higher Education Financial Patterns in Three Countries

| Country | Public Sector | Private Sector Major Sources of Funds: Recurrent Expenditures | Capital Expenditures | Research and Graduate Expenditures |
|---|---|---|---|---|
| Chile | mixed | mixed | mixed | state |
| Mexico | state | private | private | private |
| Brazil | state | private | mixed | state |

Source: Adapted from Levy (1986).

For Latin America as a whole, differences in sources of funds between public and private institutions are detailed in Table V.3. As noted in the earlier table, public institutions overwhelmingly rely upon the state for funds, with only 6.4% (in 1971) of funds coming from own sources, including fees paid for university non-instructional services. Private institutions, on the other hand, receive about 63% of their funds from own sources, primarily tuition revenue and another 28% from the government. Here, too, one finds considerable variation across countries. In Peru the Catholic University received 23% of its revenue from government in 1984 but other private institutions received nothing; in Brazil the Catholic universities receive 58% of revenues from tuition, another 23% from fees (principally hospital revenues), 12% from government contracts (primarily for research), and less than 4% from unconditional government grants. [72]

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72/ See Annex V.2. The Catholic university (PUC--Rio) in Rio de Janeiro is atypical of other private universities in Brazil. It receives fully 59% of its revenues in the form of government contracts, while only 24% is derived from tuition revenue.

Table V.3

Sources of Funds in Latin American Universities
(percentages)

| Sector | Number of Universities | Sources of Funds<br>State | Private Donors | Own Income | Other | Total |
|---|---|---|---|---|---|---|
| 1962 | | | | | | |
| Private | 21 | 27.4 | 6.0 | 65.5 | 1.1 | 100 |
| Public | 103 | 84.1 | 1.8 | 12.6 | 1.5 | 100 |
| Total | 124 | 79.0 | 2.2 | 17.4 | 1.4 | 100 |
| 1971 | | | | | | |
| Private | 61 | 27.9 | 0.6 | 62.8 | 8.7 | 100 |
| Public | 130 | 87.3 | 2.3 | 6.4 | 4.0 | 100 |
| Total | 191 | 79.9 | 2.0 | 13.4 | 4.7 | 100 |

Note: Total higher education spending in 1962 was US $ 223.7 million and in 1971 was US $ 888.0 million.

Source: Levy (1986), p. 222.

Private donations do not play a major role in financing either public or private higher education, due in part to a lack of tradition in charitable giving to education and in part to a lack of incentives in income tax laws. However, the potential for private donations exists. Latin America has its share of the wealthy, who in other countries (e.g., the U.S.) have founded universities or research foundations. In addition, the same multinational corporations that make large contributions to higher education in other countries also exist in Latin America.

## Causes and Consequences of Fiscal Dependence

Dependence of public institutions on government financing is the result of a widely held social accord on higher education in Latin America dating from at least the 1918 Cordoba movement. That accord emphasizes equal access, which is implemented as free admission, and institutional autonomy, which takes the form of government finance of higher education with little accountability by universities regarding how funds are used. Receipt of funds from other sources--business contracts or contributions, donations by the wealthy, even government research contracts-- implies accountability and loss of autonomy.

Dependence on government finance is not without its own difficulties, however. Political regimes unfriendly to the university can do great harm to the institution simply by withholding government funding. And the fiscal welfare of the university is closely tied to that of the government, resulting in the decade of the 1980's in sharp reductions in real government expenditures on higher education.

Private institutions tend not to be as dependent on a single revenue source as public institutions. Still, as shown in Table V.3, almost two-thirds of total revenues is derived from tuition and fees. The common reluctance by government to promote or assist private higher education also has historical roots. There has been concern about the influence of the dominant religion of the region on political affairs. Since many of the better private universities have a religious affiliation, this position has been expressed in efforts to limit their role or to deny financial aid to those institutions. In recent years, this concern has lessened, and some countries (e.g., Brazil, Chile, Peru) provide direct aid to the Catholic universities. However, the vast majority of private institutions of higher education receive no direct aid from government. In countries with student loan programs, they do, however, receive some indirect aid in the form of tuition discounts to students.

The consequences of dependence on tuition revenue are innovation, low quality, and limited course offerings. Private institutions have innovated in terms of types of programs and times of instruction to meet the demand of their clientele. In this respect they are more sensitive to demand than are public institutions. On the other hand, their clientele is also sensitive to price, and the quality of many newer private institutions of higher education is perceived as being both low cost and low quality. Those few private institutions perceived as being of high quality or having the potential for developing into centers of excellence face another problem stemming from dependence on tuition revenues. Governments frequently control the tuition institutions can charge and thereby directly limit their revenues and indirectly constrain quality of instruction. Finally, heavy reliance on tuition revenue, combined with a failure to price-discriminate by field, provides an incentive to private institutions to offer specialties primarily in low-cost fields (e.g., education, law, management) and avoid high-cost fields in the sciences and engineering.

## D. Private Finance of Higher Education

The private share of higher education finance can be measured in three alternative ways: (i) user fees as a percentage of unit cost in public institutions, (ii) total private costs (user fees, opportunity cost, and other direct private expenses) as a percentage of the total social cost of public higher education, and (iii) total private costs in both the public and private sectors as a percentage of the total social costs of higher education in the two sectors.

Table V.4

User Fees as Percentage of Higher Education
Unit Cost in Selected World Regions, 1980

| Region | Percentage of Countries With no Fees | User Fees as Percentage of Unit Cost |
|---|---|---|
| Africa | 69 | 8.3 |
| Asia | 13 | 12.0 |
| Latin America | 0 | 5.9 |
| All | 30 | 8.2 |

Source: Jimenez (1987), Table 2-2.

As shown in Table V.4, relative to Africa and Asia, user fees as a percentage of the unit cost in Latin American public institutions is small. In addition, since user fees include fees paid for noninstructional services such as university hospital services, the figures in Table V.4 overstate the private share of public higher education finance. Furthermore, as shown in Table V.5, there is substantial variation within the region with respect to this measure of private finance, ranging from less than 1% in Paraguay to 25% in Chile. This measure is most useful from the fiscal perspective of public higher education finance.

### Table V.5

### Actual User Fees and Private Costs of Higher Education and Impact of a 10 Percent Increase in Fees on Enrollment if Fee Revenues Used to Expand Higher Education

| Country | User Fees as a Percentage of Unit Public Cost | Private Cost a Percentage of Total Social Cost | Percentage Increase in Enrollment if Cost Elasticity Were | |
|---|---|---|---|---|
| | | | 0 | -0.5 |
| Bolivia | 1.0 | 17.0 | 0.1 | 0.2 |
| Brazil | 5.0 | 18.3 | 0.5 | 1.1 |
| Chile | 25.0 | 25.0 | 3.3 | 10.0 |
| Colombia | 3.4 | 17.8 | 0.4 | 0.7 |
| Costa Rica | 8.0 | 19.3 | 0.9 | 1.9 |
| Dominican Rep. | 1.0 | 17.0 | 0.1 | 0.2 |
| Ecuador | 2.0 | 17.3 | 0.2 | 0.4 |
| Guatemala | 10.0 | 20.0 | 1.1 | 2.5 |
| Honduras | 10.0 | 20.0 | 1.1 | 2.5 |
| Paraguay | 0.7 | 16.9 | 0.1 | 0.1 |
| Uruguay | 5.0 | 18.3 | 0.5 | 1.1 |

Source: Jimenez (1987), Tables 7-6 and D-1.

Table V.5 also reports for several countries total private costs as a percentage of the total social cost of public higher education; the (unweighted) average for the eleven countries reported is 18.8%. Thus, the opportunity and other direct costs associated with public higher education far exceed the magnitude of user fees in Latin America. This measure is most useful from the perspective of the private share of social investment in public higher education.

Finally, knowing unit costs, opportunity costs, and the sources of funds in public and private higher education one could calculate the total private costs of higher education relative to the total social costs of higher education in a country. [73] The size of private share of higher education enrollments would greatly influence this measure of the private share of higher education finance. For example, the private share of finance would be very high for a country such as Brazil where almost two-thirds of students are enrolled in private institutions, while for a country like Uruguay where there are no private institutions, the private share would be unchanged from the figure (18.3%) reported in Table V.5. This measure is most useful from the perspective of the private share of social investment in all of higher education. Since this measure most accurately reflects public policy regarding private finance of higher education, it is unfortunate that no studies exist comparing countries across Latin America or comparing Latin America with other developing regions of the world.

## Pricing Policies

Higher education can and does charge prices for a number of services, including instruction (tuition), research (overhead charges), and products sold by auxiliary enterprises such as hospitals, bookstores, cafeterias, and student housing. Economic theory argues that prices should be set at the marginal cost of providing services. However, there are several reasons why marginal cost pricing may not be entirely appropriate in the case of higher education. These reasons include market failures in other sectors (e.g., imperfections in the capital market regarding borrowing for human capital investment), external benefits (e.g., new knowledge), possible adverse equity consequences, and the possibility of decreasing average costs. [74] As will be argued later, these problems are best handled, not by setting prices near zero but, in most cases, by setting prices near marginal cost and instituting specific government policies and programs to address market failure, equity, and other concerns.

Public policy in most of Latin America is to set a price near zero for instruction in public institutions while setting a price near marginal cost for instruction in private institutions. [75] No accurate data exist on prices public and private institutions charge for research, but the most prestigious research university in Brazil, the University of Sao Paulo, has only recently been successful in instituting a 5% overhead rate on some contracts. [76] Similarly, there are no published data on prices charged by auxiliary enterprises like hospitals, cafeterias, etc., but they are reputed to be heavily subsidized. Table V.3 indicates that all Latin American countries levy some fees in public higher education, but the prices charged are low, covering in aggregate only 5.9% of unit costs, a lower percentage than that found in either Africa or Asia. There are some public institutions (e.g., state universities in Mexico, municipal universities in Brazil) that charge considerably larger tuition fees, but there are few recent examples, aside from Chile, of large increases in tuition fees at existing public universities.

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[73] Opportunity costs are likely to vary between public and private institutions because the proportion of working students differs, with students in private institutions more likely to work during the day and attend evening classes.

[74] These reasons are examined in detail by Jimenez (1987) and, thus, are not further explored here.

[75] There is very little economic justification for such radically different pricing policies. Presumably, to the extent higher education generates external benefits, both public and private institutions do so, and both warrant government subventions. Equity could argue for existing pricing differences, if public higher education is reserved for low income students, while private higher education is largely attended by high income students, but in some Latin American countries private institutions provide greater access by low income students than do public institutions.

Why does public higher education fail to correctly price its services? [77] A major explanation may be the tradition of "free" higher education and the widely-held perception that very low tuition assures equality of educational opportunity. In addition, students understandably oppose higher tuition charges and under the system of governance in many Latin American universities play a role in electing the university administration which makes the pricing decisions. And autonomy typically means the government allocates unconditional funds to the university, which has considerable freedom to use the funds to either keep tuition low or improve quality. Politically, both within and outside the university, there are high costs to advocating tuition increases and few short-run benefits.

The consequences of incorrect pricing are several: (i) excess demand (at prevailing near-zero prices) for university places, especially in fields with high private rates of return, (ii) lower quality and/or lower access, (iii) reduced equity in terms of income distribution and (iv) higher average costs per university graduate. The demand for admission to public universities is a function of several factors, including demographic factors, quality relative to private institutions, and prices relative to private institutions. In addition, demand for admission to specialized fields depends in part on differences across fields in expected earnings; since tuition levels typically do not vary across fields, excess demand is typically highest for especially remunerative fields.

Since low tuition limits university revenues, one consequence is either lower quality than would otherwise exist or reduced access. For example, Table V.5 lists the expansion which could be financed by a

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[76] Analysis by the Council of Governmental Relations suggests an overhead rate of 60 - 70% is warranted by the true costs of carrying out research activities in universities.

[77] It should be noted that this question could be asked in many regions of the world. In the U.S., for example, tuition charges in public institutions are below marginal cost and much lower than charges in private institutions; in addition, public institutions tend to charge overhead rates for research contracts which again are less than actual costs and about half the rates levied by private universities.

10% increase in user fees under two alternative assumptions about elasticity of supply. According to these computations, a 10% increase in fees could bring about as much as a 10% increase in enrollment. Another effect of low tuition is a highly unequal distribution of higher education subventions across income classes and, consequently, a worsened income distribution; this consequence was examined in more detail in the preceeding chapter.

Finally, low tuition provides no incentive for students to finish their educations quickly and seek employment. On the contrary, low tuition combined with subsidized meals encourages students to remain in school, to repeat courses, and to wait for employment offers that meet their prior expectations. The result is higher costs per university graduate than would otherwise exist.

## Student Loans

Student loans are often suggested as a means of correcting a failure in the capital market and expanding the private finance of higher education by (i) permitting establishment of higher tuition charges in public institutions and (ii) encouraging enrollment expansion via the private sector at low public cost. Another rationale for student loans is to improve equity by helping lower income students finance the private costs of higher education. In principle, student loans can accomplish all these objectives at low cost to the government treasury. In practice, they have had limited success.

Eighteen countries in Latin America and the Caribbean have by now established student loan programs with the largest programs being in Brazil and Colombia (see Table V.6). [78] There is no evidence that the existence of the programs led to higher user fees, but in at least one case (Jamaica) the student loan program is being expanded as a result of large increases in university tuition levels. On the other hand, loans to cover private university tuition helped to rapidly expand demand for and enrollment in new private institutions. The countries with the two largest loan programs in Latin America also have the largest private sectors in higher education. [79]

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[78] Woodhall (1983) has provided a recent evaluation of these programs that constitutes the major source material for this section.

[79] An early evaluation by Jallade (1974) of Colombia's ICETEX for the period 1969-1971 found students enrolled in private universities received 36% of the loans and 44% of loan funds; at the time private university enrollments represented 46% of total Colombian enrollments. In aggregate, ICETEX funded about 10% of total private sector tuition revenue. In addition, 72.4% of the average loan to a student in a private institution was eamarked for tuition, while 74.3% of the average loan to a student in a public institution was earmerked for living expenses.

### Table V.6

### Number of Higher Education Students Receiving Student Loans, Selected Countries (thousands)

| Students Country* 1976-78 | Number of Students in Higher Education, 1978 | Number of Receiving Loans, 1976-78 |
|---|---|---|
| Brazil | 1,251 | 388 |
| Colombia (ICETEX) | 211 | 56 |
| Ecuador (IECE) | 235 | 14 |
| Panama (IFARHU) | 34 | 4 |
| Venezuela | 282 | 2 |

Note: Acronym of student loan organization given in parentheses.

Source: Woodhall (1983), p. 33.

In principle, student loan programs can eventually become self-financing through repayments of student loans. This has not occurred in Latin America as a result of high growth in the programs, payment defaults, and failure to index repayments for inflation, which in some cases has effectively converted the loans into grants.[80] Even Colombia's ICETEX, the oldest and most successful program in Latin America, generated only 20% of loanable funds in 1979, in part due to rapid growth in the size of total loans.

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80/ For example, the Credito Educativo program in Brazil was initiated in 1976 with annual interest rates of 15% but no monetary correction for inflation (Mello e Souza and Faro, 1980). High annual rates of inflation after 1976 combined with a default rate in excess of 50% led to discontinuation of the program in 1980. The program was reformulated effective 1983 with an annual interest rate of 5%, indexing of the principal at 80% of price changes, and a required cosigner (June 1987 interview with Walter Garcia).

Even though student loan programs have apparently suffered from design flaws, inadequate administration (especially in collections) and unexpected changes (e.g., inflation) in the economic environment, they have resulted in expanded enrollments in private higher education at a lower costs than would have been the case under similar expansion of the public system. Latin American experience with student loans should be seen less as a failure of the programs themselves and more as a learning experience in how to organize and manage such programs and as a success in expanding higher education enrollments at reduced public cost. The early Brazilian experience with student loans, for example, was essentially equivalent to an experiment with income-contingent tuition vouchers.

### Scholarships

In addition to fee levels and subsidized student loans, another factor which influences the private share of higher education finance is scholarships or grants to either needy or especially meritorious students. While merit-based grants are common at the graduate level for study both within and outside the country, scholarships at the undergraduate level are rare. Such scholarships as exist are often provided out of the university's general budget instead of being either a line item in the budget or a special government program. [81]

## E. Capital Facilities

Finance for new capital facilities in public higher education has typically come from either the government budget or bilateral and multilateral foreign financial sources. Capital investment in private higher education has typically come from the private business community, private venture capital, accumulated surpluses of the institution, and borrowing from private financial institutions. The major exception is Chile where as early as 1954 the government allocated funds for construction of capital facilities in private universities. [82] In neither public nor private Latin American higher education is there the tradition of private donations for capital facilities that exists in some other regions.

The Inter-American Development Bank (IDB) has been the most important foreign source of finance in recent years. IDB initiated 22

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81/ In 1986, for example, Brazilian federal universities funded three types of financial aid out of their own budgets--"monitor" grants for outstanding students likely to continue university careers, grants for special research projects, and work-study grants for financially needy students. The total sum spent was less than 0.01 percent of federal spending on undergraduate education.

82/ The 1954 legislation earmarked 0.5% of government revenue for construction of research facilities; 7/18 of total revenues was available to private institutions (Levy, 1986, p. 79).

higher education projects between 1970 and 1984 with a total project cost of $703 million and IDB loans of $379 million, primarily to finance construction of new physical plant (IDB, 1985). [83] The U.S. Agency for International Development also played an important role in financing capital investment in the 1960's; projects were often large ($20 million or more) and long-term (up to 20 years), including a Brazil project that lasted 21 years (Seymour, 1985).

## F. Budgeting for Public Higher Education

The budget setting process in higher education establishes behavioral incentives; it is the means by which the government can most effectively induce universities to act in the public interest (i.e., maximize external efficiency). The budgeting process can be used not only to provide incentives but, also, to learn more about the cost and effectiveness of specific public or private higher education programs receiving public funds. There is, in general, a problem of information assymetry in public budgeting: the service provider (university) has more information about the institution's cost and production functions than does the funder (in the form of legislative and executive organs). The university can mislead the funder regarding the costs of attaining the funder's objectives and thereby gain slack resources to use in ways consistent with the university's own objectives. Information assymetry can be reduced through program budgeting which provides information on both costs and outputs by specific programs.

In general, higher education budgeting in Latin America neither establishes explicit incentives for university behavior nor does it generate the information required to guide public funding decisions. For example, in Mexico funding levels appear to be determined by the size of last year's budget, student enrollment, and ad hoc politics. Performance criteria play almost no role in determining an institution's budget, although student population alone explains 91% of the variance in the total funding of universities. [84]

The unique level of university autonomy found in many countries appears to be inconsistent with program budgeting. Often universities are given lump sum budgets, not disaggregated by program, and freedom to allocate funds within the institution. Again, in Mexico budget requests go from the faculty or department to the rector who makes a lump sum request to the government. The university is not held accountable to the government for its use of funds; it need only report to its university council. Since there are no program budgets, there is no need for either financial or performance auditing. [85]

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83/ In the longer time period 1961-1984, IDB supported development of more than 100 institutions of higher education in the region with a total contribution of $530.6 million, including loans of $508.0 million and technical cooperation of $22.6 million, which supported scholarships and technical assistance (Herman, 1985).

84/ Levy (1985), p. 124.

85/ Brazilian finance of graduate education is an exception. The Coordenacao de Aperfeicoamento de Pessoal de Nivel Superior (CAPES) in

Continued on next page

Table V.7

Inflation and Higher Education Budgets and Expenditures in Brazil, 1979-1984 (Cr$ billions)

| Year | Initial Budget | Final Expenditures | Percentage Difference | Annual Inflation Rate |
|---|---|---|---|---|
| 1978 | 16.7 | 23.7 | 41.8 | 40.8 |
| 1979 | 26.9 | 38.3 | 42.2 | 77.2 |
| 1980 | 42.7 | 94.9 | 122.2 | 110.2 |
| 1981 | 91.7 | 176.3 | 92.3 | 95.2 |
| 1982 | 212.8 | 397.0 | 86.6 | 99.7 |
| 1983 | 536.1 | 773.5 | 44.3 | 211.0 |
| 1984 | 1,257.1 | 2,396.8 | 90.7 | 223.8 |

Source: Velloso (1987), Table 9.

Even when the budgeting process is used, either within the university or between the university and the government, to provide behavioral incentives, incentives and plans can be rendered ineffective by inflation. For example, in Brazil the budget is largely fictitious. As shown in Table V.7, between 1978 and 1984, with inflation averaging over 100% per year, the variation between final expenditures and the initial budget varied between 42% and 122%. Whatever the incentives in the initial budget, more important are the criteria for determining supplemental appropriations.[86]

## G. Policy Choices

New financing arrangements in Latin American higher education could increase diversity of funding sources, allow expansion of access with little or no increase in government spending, improve access by potential

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Continued from previous page
the Ministry of Education carries out evaluations of all graduate level programs receiving public funding, and that information is used in constructing the budget for each program in following years.

[86] Ironically, one complaint of this effect of inflation is that university autonomy is reduced by the need to request supplemental appropriations from the government (Velloso, 1987).

students from low income families, and improve the cost-effective use of government funds in higher education. Several specific recommendations and policy choices follow.

1. The private share of higher education finance should be increased, both by encouraging development of private institutions and increasing cost-recovery in public institutions. Increasing the private share of higher education finance would permit continued expansion of enrollments and access and/or improvements in instructional quality in the face of constrained government spending on higher education. Increasing cost- recovery in public institutions, especially in the form of increased user fees, would also help diversify revenue sources and improve equity in the distribution of government subventions.

Expansion of or quality improvements in the private sector can be encouraged by a number of specific policy choices: (i) eliminating tuition-price controls; (ii) providing selective and limited direct government subventions (e.g., for physical plant) to aid development of new institutions or improve quality of existing institutions; and (iii) limiting public sector enrollments and institutions to the number that can be adequately supported at existing government higher education expenditure levels. In countries already having large private sectors (e.g., Brazil, Colombia) the emphasis of public policy might be more on improving quality in those institutions than on expanding their size.

Cost-recovery by public institutions can be enhanced in several ways: (i) increasing net tuition payments for students with the ability to pay; (ii) allowing students to choose between performing mandatory public service upon graduation or making tuition payments; (iii) levying surcharges on income tax liabilities of university graduates or students' families (an idea seriously considered in Argentina); (iv) raising bookstore, cafeteria, and hospital prices to cover actual costs; (v) introducing overhead rate charges for government and business contracts; and (vi) expanding research contract activity with government and business.

Because opportunity costs represent the largest portion of private costs of higher education, tuition could be raised significantly with only minor impacts on the total private cost and minor impacts on enrollments by those affected. For example, using the data in Tables V.3 and V.4, if user fees were doubled from an average 5.9% to 11.8% of the unit cost, average total private costs as a percentage of the social costs of public higher education in Latin America would increase from 18.8% to approximately 24%. To guarantee access by low-income students, their net tuition charges should in general not be increased; this could be assured through need-based scholarships or a system of income-contingent fees.

Tuition fees might also be raised selectively depending on field of specialization. This is not an uncommon practice in both public and private institutions elsewhere in the world. For example, students who enroll in high cost specializations (e.g., engineering, medicine) with high private rates of return might be expected to pay higher than average tuitions, although perhaps in a scheme (e.g. student loans) which permits payment to be deferred until the student is earning income.

The political difficulties in correctly pricing higher education services should not be underestimated; in some cases either the National Constitution or the Education Law may require that all public education be free. [87] For these reasons, income tax surcharges or mandatory public service, might be more politically acceptable than violation of the principle of zero tuition. Bookstore and cafeteria prices might be most easily corrected by allowing universities to delete these from their portfolio of activities or to contract with private firms to provide nonsubsidized services on the campuses.

2. Student financial aid programs should be improved, expanded, and extended to students enrolled in both public and private institutions. The introduction of effective cost- recovery programs in public universities would both require and provide resources for expanded financial aid. That aid should take the form of (i) scholarships and grants to offset tuition charges and other private costs of higher education for children from lower income homes and (ii) loans to defray the burden of tuition payments for middle-income students. Students from higher income homes would be eligible for neither scholarships nor loans. In addition, no distinction should be made between accredited public and private institutions with respect to student eligibilty for such financial aid. Allowing private university students to receive government financial aid would only improve equality of educational opportunity; furthermore, while private sector eligiblity would increase the government's higher education budget, it would also permit government to expand enrollments in private institutions at lower cost than could be done in public institutions.

Student loan programs themselves could be improved in terms of cost-recovery through indexing of principal for inflation, levying market-level real interest rates, requiring adult cosignatories, and improving management practices. [88] In addition, there are good reasons for subsidizing student loan programs in the form of below market interest rates or deferred repayment terms if expanded programs are accompanied by higher tuition in public universities or an expanded share of private university enrollments in higher education.

3. Both public and private institutions should be given improved access to financing for capital facilities. The procedures and criteria by which public institutions are allocated funds for physical plant should be made explicit, regularized, and depoliticized, to the extent possible.

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87/ The Venezuelan National Constitution, for example, stipulates that all public education should be free, but it also specifically states exceptions could be permitted for economically advantaged students in higher education (Mendoza Angulo, 1986). Both the principle of free admission and the restriction of public funding to public instituions have also received serious debate in the Brazilian constituent assembly.

88/ For example, the IDB reports that more rigorous collection procedures reduced the arrears rate from 77% to 6% over a five period for a university-specific loan program which it helped financed (IDB, 1985).

In addition, private institutions should be eligible for either direct government subsidies or government-assured access to the capital markets in order to finance expansion and improvement of private higher education. The rationale for private university access to government credit for capital investment is that student enrollments and instructional quality can be increased at lower public cost. This argument is especially strong in the case of very low tuition levels in public institutions. Credit policies of this type have been successfully employed in Japan and South Korea in expanding and improving quality of private higher education.

4. Budgeting in public higher education should be more closely tied to university performance in meeting government objectives. Budgeting could be improved by (i) adopting explicit performance criteria in determining budget levels, (ii) indexing the budget for price changes in highly inflationary economies, and (iii) introducing program budgeting practices that include information on both costs and outputs.[89] Proposals for new budgeting practices poses the tradeoff between university autonomy and efficiency in the use of government funds. Movement has been away from autonomy to assure greater accountability in the use of government funds in both Great Britain and some of the U.S. states in the past decade. Since university autonomy is highly valued in Latin America, the challenge is how best to improve budgeting practices while having the smallest impact on autonomy.

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89/ For example, a Mexican scholar proposes the following criteria for allocation of federal higher education funds in Mexico: percent of funds received from own sources; diversity of funding, including the community and own production; efficiency in resource allocation; meet the socioeconomoic needs of the region; existence of coherent plans for self-development; and age and status of institutions (Castrejon Diaz, 1979).

## VI. GRADUATE EDUCATION AND RESEARCH

### A. Introduction

Highly skilled labor and new knowledge have played an important role in the development of the industrialized economies and will play an increasingly important role in Latin America's growth as well.[90] The larger role for science and technology in the region's economies requires major investments in scientific and technological infrastructure and in high level manpower development. These investments will be financed and undertaken by both the public and private sectors and will cover a range of functions, including development of highly skilled labor, basic and applied research, technology development, and application to production.

Information is a classic public good, which suggests that without government intervention to encourage the production of information (i.e., research) the amount produced by the market will almost certainly be too small. In addition, by its nature basic research entails more externalities than applied research; hence, the social rate of return to basic R & D work is much higher than the private rate. Thus, governments must play an important role in financing basic R & D, and a high proportion of such research typically is undertaken in the university, where it is jointly produced with graduate instruction.[91] Applied R & D, on the other hand, is typically financed and provided privately.

Relative to industrialized regions, Latin America's R & D effort is small and highly concentrated in basic research; most research in Latin America tends to be basic in nature, compared to only 10-20% in industrialized countries (Jones, 1971). The stock of scientists and engineers relative to the population is low. R & D expenditures as a percentage of GNP is small. And private investment in R & D is very small; the private sector in Latin America contributes only 3.5 percent of total R & D investment, compared to 60 - 70 percent in developed market economies (Herrera, 1973).

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[90] Attempts to determine the relationship between education, new technology, and economic productivity have included exercises in growth accounting (e.g., Denison, 1962), direct estimates of productivity in aggregate production functions (e.g., Solow, 1957; Jorgenson, 1983) and calculations of social and private rates of return to investments in R & D (e.g., Griliches, 1958). These studies have concluded that education and new technology are important in explaining economic growth. More recent work by McMahon (1984) on the determinants of labor productivity growth in OECD nations found no statistically significant independent relationship between R & D investment and labor productivity, but concluded that it has important indirect effects via human and physical capital deepening.

[91] See Averch (1985) for elaboration of these arguments. The externalities associated with R & D diminish as research becomes more applied, arguing for government intervention focused more on the research than development side of R & D.

Governments not only play an especially important role in financing graduate education and research in Latin America, they also provide most of the R & D and almost all of the technical and scientific graduate education. The joint production of graduate education and research implies that, other things held equal, universities can probably carry out research at lower cost than independent public or private research institutes. One can certainly question, however, if universities should continue to enjoy this near monopoly in the supply of R & D.[92]

## B. R & D Effort

The science and technology infrastructure can be measured using several indicators, including the composition of the labor force, spending levels on R & D, and the productivity of R & D spending. In each of these respects, Latin America lags far behind the developed countries. And, while Latin America surpasses much of the developing world in terms of access to undergraduate education, the same cannot be said of its R & D effort, especially in terms of research.

Table VI.1

Number of Scientists and Engineers per Million Residents and R & D Expenditure as Percent of GNP by World Regions

| Region | Scientists and Engineers | | R & D Expenditure | |
|---|---|---|---|---|
| | 1970 | 1980 | 1970 | 1980 |
| Africa | 56 | 91 | 0.34 | 0.36 |
| Asia | 219 | 271 | 0.99 | 1.08 |
| North America | 2,515 | 2,679 | 2.59 | 2.33 |
| Latin America | 135 | 251 | 0.30 | 0.49 |
| Developing Countries | 84 | 127 | 0.32 | 0.45 |
| Developed Countries | 2,317 | 2,986 | 2.36 | 2.23 |

Source: Unesco Statistical Yearbook (1987).

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92/ Sagasti (1979), for example, makes the argument for carrying out applied and action-oriented research in university-affiliated but independent research centers.

A commonly used indicator of the level of R & D labor skills is the number of scientists and engineers relative to the size of the overall labor force. As shown in Table VI.1, Latin America appears to fare well relative to developing countries as a whole using this criterion. There are 251 scientists and engineers per million residents in Latin America compared to 127 per million residents in developing countries as a whole; furthermore, the Latin American ratio almost doubled between 1970 and 1980. But comparing Latin America to the developed world yields a different picture. Latin America has only one-tenth the number of scientists and engineers, relative to population, as do the developed countries. Furthermore, while there is considerable variation in this ratio across countries in Latin America, the largest countries in the region do not vary much from the average.[93]

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[93] See Annex VI.1

## Table VI.2

### R & D Expenditures and Investigators by Country
(in current US $)

| Country | R & D Expenditures ($ millions) | R & D as Percent of GNP | R & D Per Capita (US$) | Expenditures Per Researcher (US$) | Researchers Per 100,000 Residents | Percent of Scientif. Authors in Latin America |
|---|---|---|---|---|---|---|
| Argentina (1980) | 684.70 | 0.47 | 24.21 | 82,944 | 31 | 17.3 |
| Bolivia (1978) | 6.00 | 0.07 | 1.14 | n.a. | n.a. | 0.5 |
| Brazil (1984) | 1,231.24 | 0.58 | 9.28 | 51,270 | 21 | 30.5 |
| Chile (1982) | 98.45 | 0.41 | 8.57 | 23,919 | 26 | 9.3 |
| Colombia (1982) | 42.97 | 0.15 | 1.60 | 29,655 | 16 | 2.0 |
| Costa Rica (1981) | 5.19 | 0.16 | 2.22 | 12,628 | 18 | 1.7 |
| Ecuador (1979) | 11.63 | 0.41 | 8.57 | 15,183 | 10 | 0.3 |
| Guatemala (1978) | 13.50 | 0.22 | 2.06 | 24,590 | 8 | 0.6 |
| Mexico (1982) | 442.71 | 0.27 | 6.05 | 42,519 | 26 | 14.5 |
| Paraguay (1980) | 4.83 | 0.12 | 1.52 | 27,919 | 6 | 0.1 |
| Peru (1980) | 64.23 | 0.30 | 3.71 | 17,082 | 23 | 1.6 |
| Uruguay (1980) | 12.64 | 0.20 | 4.35 | 10,310 | 43 | 0.6 |
| Venezuela (1980) | 252.58 | 0.43 | 16.81 | 164,435 | 14 | 14.4 |

Source: Sagasti and Cook (1985), Tables 8, 29; International Development Research Centre (IDRC) (1982), Table 5.

Note: Year of data given in parentheses; expenditure data are for R & D in universities, government institutes, private research institutes, and public enterprises; no data are available on R & D expenditures by private production enterprises.

Another measure of science and technology development is the number of researchers relative to the population of a country, shown in Table VI.2. The number per 100,000 residents in Latin America varies from only 6 in Paraguay to 43 in Uruguay, with the larger countries falling in the range 20 -30.

## R & D Expenditures

R & D expenditure as a percent of GNP is low in Latin America.[94] As shown in Table VI.1, the ratio is 0.49 for Latin America, which is only slightly higher than the ratio for all developing countries and far below the ratio (2.23) for the developed countries.[95] Here, too, there is considerable variation between countries, ranging from 0.07 in Bolivia to 0.47 in Argentina and 0.58 in Brazil, but again all countries fall far short of the developed country average. Reported R & D expenditures for Latin America are understated because they include only publicly financed R & D. On the other hand, R & D expenditures for developed countries include defense-related R & D; in the United States, for example, defense represents almost one-quarter of total R & D (Nelson, 1984).

Four other characteristics of R & D expenditures in Latin America merit attention. First, R & D expenditures per capita are positively correlated with per capita income, with the highest expenditures in the highest income countries, Argentina and Venezuela. Second, expenditures per researcher reflect both researcher salaries and the level of research support. These figures, too, tend to vary directly with per capita income. Third, R & D expenditures are highly concentrated in just a few countries with Argentina, Brazil, Mexico, and Venezuela representing about 91% of total reported spending in the region.

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94/ Note that R & D expenditures include expenditures in universities, public enterprises, and public and private research institutes. No uniform data are available on R & D expenditures by industry; thus, the reported data are underestimates of total R & D expenditures in the countries.

95/ One partial explanation for the differences between developed and developing countries is the much better collection of data on private industry R & D expenditures in developing countries; total R & D expenditures in developing countries are in general underestimated.

## Table VI.3

### R & D Expenditures Over Time for Selected Countries (in millions of 1980 US$)

| Country | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|
| Brazil(1) | 1,432 | 1,347<br>(519) | 1,480<br>(860) | 1,559<br>(982) | 1,194<br>(751) | 958<br>(699) |
| Chile(2) | 104.9 | 119.6 | 112.3 | 82.5 | n.a. | n.a. |
| Mexico(3) | 507<br>(50) | 796<br>(73) | 1,014<br>(104) | 558<br>(64) | 368<br>(45) | 640<br>(50) |
| Peru(4) | n.a. | 64.2 | 62.8 | 49.5 | 42.3 | 23.3* |
| Argentina | 309 | 648 | 633 | n.a. | n.a. | n.a. |

* estimated.

Notes:
(1) Total expenditures on R & D. Figures in parentheses are federal government R & D expenditures in millions of 1980 US dollars; 1985 federal R & D expenditures were $1,220 million.
(2) Expenditures in R & D in millions of 1980 US dollars.
(3) Federal government expenditures on science and technology in millions of 1980 US$; numbers in parentheses are the expenditures of CONACYT.
(4) Expenditures in science and technology in public universities and state research institutes.

Source: Centro Nacional de Pesquisa (CNPq) (1987), Table II.1, and Sagasti and Cook (1985), various tables; UNESCO, Statistical Yearbook, various years.

Fourth, real R & D expenditures grew rapidly in the decade 1970 - 1980, only to be followed by abrupt reductions.[96] As shown in Table VI.3, in Brazil, expenditures declined by about one-third between 1982 and 1984; in Chile there was a one-quarter reduction from 1981 to 1982; in Mexico spending in 1983 was 64% lower than in 1981. The overall picture of government funding of R & D is one of sharp changes from year to year.

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96/ Real federal government research expenditures in Brazil grew at a 31.5% annual rate of growth from 1970 - 1975 and a 4.4% rate of growth from 1975 - 1980 (IDRC, 1982).

## Productivity

The productivity of R & D spending in terms of publications and patents varies widely across countries in Latin America, too; comparable data are not available worldwide. Table VI.2 demonstrates that four countries dominate the region in terms of scientific publications. Argentina, Brazil, Mexico, and Venezuela in aggregate have 76.7% of all scientific publications, which is not quite commensurate with their share of total R & D expenditures. Table VI.4 provides another picture of how research productivity varies across countries. The ratio of full-time equivalent researchers to authors gives a measure of the amount of research time required to yield a publication. By this measure, Chile, the Dominican Republic, and Venezuela are relatively efficient compared to Ecuador and Peru.

Another measure of research productivity is the gain in production resulting from research. In this respect, too, Latin America suffers by comparison with more developed areas. In the decades following World War II, for example, agricultural production increased at a 3.7% annual rate, only one-third of which was due to improved productivity. In Europe, on the other hand, 80 percent of increased agricultural production was due to improvements in productivity. And in the U.S. aggregate agricultural output increased 25 percent, while cultivatable land decreased by 18 percent (Schatan, 1970).

Table VI.4

Indicators of Productivity in Science and Technology
(expenditures in millions of US current dollars)

| Country/Year | Ratio of Researchers to Authors | Ratio of R&D Expenditures to Authors | Ratio of Researchers to Patents | Ratio of R&D Expenditures to Patents |
|---|---|---|---|---|
| Argentina (1982) | 12.38 | 0.45 | 11.91 | 0.43 |
| Brazil (1982) | 13.58 | 0.75 | 67.72 | 3.74 |
| Chile (1982) | 4.18 | 0.09 | 63.80 | 1.39 |
| Colombia (1982) | 42.58 | 0.38 | 132.47 | 1.19 |
| Costa Rica (1981) | 14.17 | 0.09 | 65.38 | 0.40 |
| Dom. Republic (1980) | 8.33 | 0.32 | 14.29 | 0.54 |
| Ecuador (1979) | 54.71 | 0.83 | 191.50 | 2.91 |
| Mexico (1980) | 11.12 | 0.40 | 59.84 | 2.14 |
| Peru (1980) | 53.98 | 0.71 | 131.30 | 1.74 |
| Venezuela (1980) | 8.58 | 0.59 | 32.22 | 2.22 |

Source: Sagasti and Cook (1985), Table 30.

Note: Only the number of patents issued to country residents are included in calculations.

The ratio of R & D expenditures to authors gives another measure of the effort required to yield a publication. Here, too, Chile appears to be especially efficient compared to Brazil, Peru, and Ecuador.

Differences in patent laws and regulations make the number of patents issued to country residents a somewhat questionable measure of R & D productivity. However, given the lack of good measures of research output in general, this measure merits some attention. The results are fairly consistent with those found for ratios of research effort to authors. The ratio of researchers to patents is especially high in Colombia, Ecuador, and Peru and low in Argentina, the Dominican Republic, and Venezuela. The ratio of expenditures to patents shows Ecuador and Brazil as relatively inefficient relative to Argentina and Costa Rica.

### Explaining Low R & D Effort

The Latin American Academies of Science (ACAL) held a meeting in Chile in 1984 at which a number of the factors adversely affecting science were enumerated (Segal, 1987). These include:

* emphasis on professional rather than research-oriented degrees;

* limited research experience of instructors of post-graduate courses;

* isolation and lack of exchange between Latin American scientists;

* continuing brain-drain of researchers;

* lack of participation of scientists in decisions regarding research projects;

* separation of scientific communities from economically productive sectors;[97] and

* insufficient community and government understanding of the role of science in development.

## C. Research and Graduate Education in the University

### Research

Universities play a critical role in producing both research and highly-skilled labor in Latin America. As shown in Table VI.5, for most countries more than half of all researchers are located in universities. In terms of personnel, universities play an especially important role in Brazil, Costa Rica, and Chile. Again, one notes the dominance of a few countries-- Argentina, Brazil, and Mexico--in terms of research capacity.

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[97] See Sabato and Botana (1970) for further analysis of this problem and its consequences for science.

Table VI.5

Indicators of Research Efforts in Universities

| | Number of Researchers | Percent of National Researchers | Percent of National Projects | Percent of R&D Expenditures by Institutional Sector | |
|---|---|---|---|---|---|
| | | | | Universities | Private |
| Argentina | 6545 | 45.1 | 42.1 | 33.3 | n.a. (1982) |
| Brazil | 15,510 | 64.6 | n.a. | 26.7 | n.a. (1978) |
| Colombia | 2592 | 54.4 | 64.4 | 15.3 | 13.0 (1982) |
| Costa Rica | 642 | 75.5 | 53.7 | 46.0 | 9.6 (1981) |
| Chile | 3691 | 81.5 | 78.1 | 54.2 | 20.3 (1982) |
| Ecuador | 306 | 39.9 | 39.9 | 14.2 | 21.7 (1979) |
| Mexico | 8858 | 46.0 | n.a. | 24.7 | 8.5 (1984) |
| Peru | 2747 | 56.5 | 62.9 | 9.3 | 5.1 (1980) |
| Venezuela | 2240 | 61.0 | 61.1 | 28.2 | n.a. (1980) |

Source: Sagasti and Cook (1985), Tables 11, 14; IDRC (1982), Tables 10, 11.

However, university research funding is not commensurate with research capacity (as measured by percent of researchers). Of total reported R & D spending, most of which is government financed, only Chilean universities receive more than 50%. Brazilian universities with 65% of all researchers receive only 27% of all research funds. And Colombian universities with 54% of researchers receive only 15% of research funds.[98]

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[98] The data for Brazil and Colombia probably reflect the important role of private higher education wherein reside large numbers of researchers receiving little in the way of publicly funded institutional support for research.

Deviations between share of research capacity and share of research funding may be both a cause and consequence of the low research productivity (in both quantitative and qualitative terms) in the university. Four causes of low research productivity in the Latin American university can be identified: (i) lack of a strong empirical research tradition; (ii) youth and immaturity of most research-oriented graduate programs; (iii) lack of critical mass in terms of trained and experienced researchers; and (iv) lack of incentives, especially financial, for conducting research.

Studies of the research performance of universities are difficult to find. One such Brazilian study found costs per unit of published research in the universities varied between $3841 and $272,000, with unit costs higher in newer universities. One reason for high costs is that faculty have light teaching loads to permit them to do research, but few faculty in fact do so. The lack of pay mechanisms to reward or penalize faculty relative to research performance provides no financial incentive for research.

## Graduate Education

The development of modern graduate education in Latin America has had to struggle against institutional patterns and traditions. Prior to WWII, graduate degrees were offered on a small scale, organized around individual study under the supervision of a senior professor. This training was seen as preparation for a scholarly career, not organized to provide highly-skilled labor to industrializing economies. Furthermore, the quality of graduate education was questionable given the relative independence of each program and the poverty of material resources that characterized the research collections and reference materials of many universities.

Introduction of graduate programs on a larger scale with systematic curriculums was met with opposition by those holding key chairs. In spite of these problems, the number of both graduate programs and enrollments has grown rapidly, most notably in Brazil (see Table VI.6). A high proportion of graduate enrollments are at the masters level, which tend therefore to be comprehensive and often require writing a thesis.

Table VI.6

Graduate Student Enrollment by Field, Selected Countries

| Country | Graduate Enrollment | Growth Rate | Graduate Enrollment as Percent of Total Enrollment | Percentage of Graduate Enrollment Nat. Science | Percentage of Graduate Enrollment Health |
|---|---|---|---|---|---|
| Mexico (1985) | 39,675 | 7.67 | 3.28 | 5.5 | 29.6 |
| Brazil (1983) | 40,405 | 10.04 | 2.73 | 14.7 | 12.2 |
| Chile (1984) | 2,371 | 11.35 | 1.20 | 24.0 | 6.4 |
| Colombia (1985) | 7,850 | 6.59 | 2.01 | 5.8 | 20.8 |

Note: Growth rate is the annual percentage increase from 1975 for Mexico, 1974 for Brazil, and 1977 for Chile and Colombia.

Source: Unesco, Statistical Yearbook (1987)

Growth in graduate programs has to some extent resulted in too many programs relative to available funding; class sizes are small, student-teacher ratios are low, and often there are insufficient qualified faculty. The dispersal of students and faculty across too many programs in theory permits competition and survival of the fittest (high quality) programs. But in practice, low quality and costly programs are rarely terminated, and dispersal of effort prevents development of the critical mass in terms of both students and faculty to develop true centers of excellence.

## D. Finance of University Research and Graduate Education

Universities receive both institutional research support and research project support from government; institutional support, which takes the form of research support facilities and services and reduced teaching loads for faculty, represents by far the largest share of the total. Unfortunately, institutional support is rarely accompanied by evaluation of institutional research performance, and faculty rarely receive rewards or face positive incentives for doing research. Another problem with institutional support for research is that it is in practice indistinguishable from institutional support for instruction. As a consequence, reductions in overall university spending can be disproportionately allocated to research.

Externally-reviewed research project funding is a relatively recent innovation in Latin America, but several countries have now established separate science and technology councils for that purpose.

These government research funding programs suffer from several ailments including: (i) in general, inadequate and decreasing funding levels;[99] (ii) no reimbursement of university overhead costs;[100] (iii) uncertain funding levels. Funding levels are uncertain in two respects. First, as shown in Table VI.3, funding levels vary dramatically from year to year, thereby putting continuation of existing projects as well as initiation of new projects at risk. Second, in inflationary economies there may be large differences between budgeted and actual research spending, again putting continuing research projects at risk.[101]

Graduate education is, also, funded both directly through the general university budget and indirectly through scholarships to students. Funding patterns vary by country, with only public graduate education receiving public financing in Mexico and both public and private graduate education receiving government funds in Brazil. The principal problems with graduate education finance are the dispersal of funding across too many programs and the failure to use funding mechanisms to provide performance incentives.[102]

## E. Policy Choices

The problems confronting graduate education and university-based research in Latin American higher education can be summarized as (i) lack of cost-effectiveness in graduate education; (ii) low research productivity; and (iii) misallocation of resources for university research. Specific recommendations to improve these problems appear below.

1. The number of graduate programs offered in the Region could be reduced. Graduate education is not cost-effective mostly due to the large number of graduate programs having small numbers of students and lacking critical mass in terms of both faculty and students. Continued proliferation of graduate programs may deter the development of regional centers of excellence in specific subject areas. At the national level, accreditation agencies should adopt minimum performance standards for the establishment of new programs. Authorities having responsibility for distributing public resources, be they education ministries or councils of rectors, should make an assessment that adequate funds will be forthcoming in future years prior to agreeing to fund new graduate programs. In addition, the selection of programs to expand or contract in size should be determined, in part, on the basis of performance criteria.

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99/ For example, the national universities in Argentina received only 6.1% of all government funds in 1983 spent on science and technology, a reduction from 22.8% in 1974 [Gertel (1986)].

100/ If research contracts represent a sizeable proportion of total university activity, the lack of reimbursement for university overhead costs implies the university is subsidizing government research projects with resources taken from other university activities, especially instruction.

101/ Annex VI.4 shows variations between budgeted and actual R & D expenditures in Brazil are as large as 32%.

102/ While this is generally true, as noted earlier, the CAPES graduate program evaluation mechanism does provide some incentives to improve performance.

In most countries graduate enrollments are too small to permit effective competition between universities for the best students and research professors. Often, there exist only a couple of reputable programs within the country in any given subject area. In the region as a whole, however, there exist enough graduate programs in a given subject area to permit comparisons on the basis of quality and, thus, help foster constructive competition leading to the development of centers of excellence.

2. Research resources could be reallocated to favor increased research productivity. Research productivity is low in Latin America and, by international standards, research expenditures are low and incommensurate with the number of qualified university faculty researchers. Perhaps research expenditures should be increased, but, first, existing resources for research could be reallocated to improve productivity.

Government or university funding of research projects is relatively low in all countries and inadequate funds are available for research facilities, equipment, and supplies. But research funding in terms of faculty time is large, in large part due to a prevailing myth that all full-time university faculty do research and, therefore, should have reduced teaching loads. Arguably, research productivity could be improved by reallocating total research resources from non-productive (in terms of research) faculty to productive faculty and from non- productive (in terms of research) programs or institutions to productive ones. In particular, the standard teaching load could in general be increased for those faculty not doing research, thereby permitting reductions in total faculty numbers, savings from which could be used to increase institutional research support. The political feasibility of such a policy is highly questionable but might be made more attractive if some of the savings from faculty reductions were used to augment faculty salaries for researchers and non-researchers alike.

3. Financial research support could be directed to the development of research capacity as well as to specific projects, and stricter performance criteria could be attached to funding. Government funding for research should take the form of both institutional and project support. Institutional support may be required over a long time period to develop the infrastructure and critical mass required for high quality research. Furthermore, since government funds for research are always limited, the number of programs receiving substantial institutional support from the government should be restricted to those judged most successful or most likely to succeed. This logic leads to the conclusion that some public entity (not necessarily the education ministry) should allocate funds for specific areas of institutional support rather than allocate block research grants to universities for them to allocate across faculties using their own criteria.

Performance criteria should also be adopted in the allocation of government funds for research projects; science and technology councils in most countries already use a peer review process to allocate funds using criteria such as qualifications of personnel and institutions applying for funding. Finally, the nature of the social benefits of research argues for all institutions, public or private, being eligible for government research funding, in the form of both institutional and project support.

# VII. STRATEGIES FOR IMPROVING EFFICIENCY AND EQUITY

## A. Summary of Findings

Enrollments in Latin American higher education have grown rapidly over the past two decades and will continue to grow if only the age group participation rate remains constant. Government funding of higher education has also grown over time, but since 1980 real spending per pupil has declined significantly. The fiscal status of most governments is unlikely to improve rapidly enough to bring about much growth in spending per pupil. Future enrollment growth will need to be financed privately, through cost-recovery in the public sector or expansion of the private sector.

In addition to constraints on future spending, this paper has identified several problems in efficiency and equity in Latin American higher education. These problems and strategies to treat them are summarized below. However, the emphasis on problems of higher education should not take away from the successes of Latin America in the sector.

Unprecedented enrollment growth has been, in most cases, absorbed relatively smoothly through combined expansion of the public and private sectors. Access, albeit to lower quality education, now approximates that found in some industrialized countries. In most countries, entry into the market by new, private institutions has been relatively easy. The addition of experimental and innovative public institutions has resulted in a rich diversity of higher education offerings.

Answers to many of the problems identified in this paper can be found within the borders of the region. The diversity of higher education offerings has resulted in a number of model institutions and policies. A small number of these are identified below.

## B. Internal Efficiency

Resource allocation is not efficient in most universities. There are too many teachers and administrative staff relative to students and too little in the way of supplies, equipment, and maintenance. Faculty pay and the percent of full-time faculty are too low. Improvements in internal efficiency will require introduction of performance criteria in allocating resources within universities; reallocation of resources from quantity of personnel to non-personnel resources and quality of personnel; reduced number of student years to produce graduates; decreased costs in admission procedures; and more intensive use of capital facilities.

Implementation of resource reallocation proposals requires (i) the existence of objective performance measures (output, costs, student flows) and information systems and evaluation procedures to generate that information; (ii) management training on how to use such information; (iii) development of uniform or standardized entrance examinations which can be used by most universities; and (iv) technical assistance in improving university curriculum, teaching methods, etc. While actual resource reallocation may be controversial politically, development of the infrastructure required to implement it should be less so.

Examples of this type of infrastructure development exist in several places in Latin America and can serve as models. The Pontificia Universidad Catolica de Chile has adopted a decentralized model of cost center management, which provides information to units within the university regarding costs and revenues and provides budgetary incentives for cost reductions.[103] A model for program evaluation is the CAPES evaluation of graduate level programs in Brazil, which has been previously discussed.[104] Bogota's Universidad de Los Andes and Brazil's Universidade Federal de Santa Catarina provide examples of professional preparation for university administration, while the Centro Interuniversitario de Desarrollo (CINDA) provides technical assistance in university administration to twenty Latin American institutions. INCAE in Costa Rica is an example of an institution which successfully provides regional technical assistance to improve instructional quality. Private institutions generally have used capital facilities more intensively than have public institutions, and have offered evening classes to working students. The Instituto Tecnologico (INTEC) de Santo Domingo operates classes throughout the year, which permits students to receive engineering degrees in a minimum of four years compared to the normal six. Finally, an example of a national system of admissions testing is provided by Chile.

## C. External Efficiency

The social rate of return to higher education appears to have declined with the rapid growth in the college-educated labor force. Variations in rates of return across fields, however, indicate that altering the instructional mix of the university could improve the overall

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103/ This model includes calculation of a university-wide overhead rate which is levied as a tax on the revenues of each unit; cost center management is used by several independent universities in the United States as well.

104/ The results of this evaluation receive wide publicity in Brazil, including annual publication of results in Playboy magazine, and provides the basis for the most comprehensive student guide to higher education in Brazil.

rate of return. Other policies which might improve the social rate of return to education include adopting lower costs alternatives (e.g., two-year community colleges, distance learning) to traditional higher education and reallocating resources from expanding quantity to improving quality of instruction.[105]

Implementation of policies to improve external efficiency by altering the instructional mix requires providing information and incentives to students and institutions alike. Students do not choose fields of study solely on the basis of pecuniary returns, but potential earnings do influence career choice. Their responsiveness to market signals could be improved by providing information on employment opportunities and earnings by field and, if possible, by institution; the latter would require tracer studies of graduates. Responsiveness could, also, be improved via flexible academic programs which permit students to delay making a specific career choice. Finally, responsiveness could be improved through financial incentives in the form of tuition differentials and financial support in the form of loans and/or scholarships. The only examples of policies to influence student career choice are the scholarships some countries (e.g., Argentina, Brazil) provide for graduate level study in specific fields.

The university is not necessarily interested in external efficiency; its interests are more likely to lie with program quality and prestige. Hence, it is appropriate for some national-level entity to establish budgetary incentives for changes in the mix of openings by field offered by the university. For public institutions, this could take the form of variations by field (or more likely groups of fields) in terms of net subsidy per student provided to the institution, with net subsidy being the difference between payment to the institution and average instructional cost per student in a given field. Private institutions would be more likely than public ones to increase supply in response to demand. Although variations in net subsidies may be implicit in the results of budget negotiations between universities and public funding authorities, funding formulae with explicit net subsidies by field do not exist.

Several countries have explored the idea of improving external efficiency by introducing low cost alternatives to the traditional university. These alternatives might not only be low cost, they might also do a better job than the university of providing more vocationally-oriented knowledge. Venezuela has a unique community college system; distance learning or open universities exist in Colombia and Venezuela. As with investments in instructional quality, however, there is no empirical evidence that these alternatives improve external efficiency.

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105/ There is no empirical support on the returns to quality improvements in higher education, although research on lower levels of schooling provides suggestive evidence [Behrman and Birdsall (1983)]. Since public university arguments for increased government subventions implicitly make this case, there should be wide support for empirical research on the topic.

Finally, external efficiency might be improved by establishing closer links between university curriculum and the needs of employers. Improved relations between the university and its community could, in general, contribute to this closer match. The lack of relevance of the public university's curriculum to the private employer has stimulated development of some unique private institutions of higher education. The Universidad del Pacifico in Peru, for example, is co-administered by a group of private enterprises.

## D. Equity

Higher education does not provide equal access to all citizens irrespective of socioeconomic status, and it is not an effective means of redistributing income. However, policies can be adopted to improve access by children from low-income homes and to assure that higher proportions of public subventions to higher education accrue to lower income groups.

Policies to improve access include financial aid to lower income students to offset the private costs of higher education; improvements in access and quality at lower education levels; and increased supply of higher education at times convenient to working students. Government loan programs in Brazil and Colombia have in the past helped finance the private costs of higher education, and eligiblity and size of the loan have been related to financial need, but government scholarship programs are very small in size. Universities themselves often have small scholarship programs, but these are often based on merit rather than financial need. There are a large number of both public and private institutions offering instruction at times convenient to working students. What is surprising is that some public institutions (e.g., most Chilean universities and most Brazilian federal universities) do not do so.

The major policy to assure that higher proportions of public subventions to higher education accrue to lower income groups is income-contingent pricing, or levying uniform tuition levels with offsetting financial aid to lower income students. Aside from Chile, this policy has not been adopted in Latin America.[106] However, excepting unusual circumstances, the political feasibility of adopting such a policy is low. What does appear to be feasible, though, is providing subsidized tuition loans to lower income students attending private institutions. If the size of subventions to public institutions with zero tuition were limited while income-contingent subsidized loans to students attending private institutions were increased, the net result would be a higher share of public subventions accruing to low income students.[107]

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106/ Eligibility for subsidized student loans in Chile is not entirely based on need, however; eligibility is weighted 60% on the basis of need and 40% on the basis of merit.

107/ By constraining public sector enrollments while providing subsidized tuition loans to students attending private institutions, both Brazilian and Colombian higher education policies in the 1970's could be interpreted as approximately matching this scenario.

## E. Finance

The finance problem in Latin American higher education has four aspects: government spending is limited, necessitating larger shares of private financing of higher education; institutions are overly dependent on sole sources of revenue; universities have limited access to funds for capital investment; and public budgets for higher education are allocated among institutions in the absence of explicit performance criteria. The policy prescriptions which follow are clear: increase cost- recovery in public institutions and expand private higher education; diversify revenue sources; provide government funding or loan guarantees for capital investment; and introduce performance criteria in public budgeting for higher education. The strategies for implementing these policies are not so clear.

The options for increasing the private share of higher education finance were discussed above. A further option is for government to subsidize or fund or provide access to funding for expansion of physical plant in private institutions, while requiring them to continue to cover their recurrent costs. This policy is employed by some state governments in the United States, but there are no examples of it being adopted in Latin America.

Diversification of revenue sources can occur in a number of ways. Public institutions can introduce cost recovery; public universities in Chile currently receive more than 25% of total revenues from tuition and fees. Donations can be encouraged; both Peru and Chile permit private enterprises making contributions to universities to reduce their tax liabilities.[108] Universities can sell or contract their services to public or private entities; several Latin American universities have increased contract revenues in recent years.[109] In addition, both public and private institutions can receive funding for specific research projects.[110]

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108/ Tax law in Chile was modified in December 1987 to permit this deduction; businesses can deduct 50% of cash contributions from tax liabilities and include the other 50% as a cost of doing business.

109/ For example, the Pontificia Universidad CAtolica de Chile receives about 9% and the Universidad de Costa Rica receives about 8% of total revenues from this source.

110/ Some institutions (e.g., PUC--Rio) receive a very significant amount of funding from research grants. In some cases, however, research funds fall outside the purview of the university. In Brazil, research funds are typically channeled through university foundations, which are legally distinct but closely tied to the university itself; however, as a result, university finance records may not accurately reflect the magnitude of research funding. In Chile, research funding from FONDECYT is given directly to the researcher or research group rather than passing through the university.

Government funds for higher education in Latin America are seldom allocated using performance criteria.[111] Furthermore while criteria are implicit in the actual allocation of funds, they are seldom made explicit so as to provide clear incentives for university behavior. The political feasibility of introducing performance criteria in allocation of government funds depends to a large extent on the tradition of university autonomy. However, even when autonomy from government is highly valued, it may be possible for non-governmental public bodies--councils of rectors, boards of trustees, etc.--to use such criteria. There is no success story in this area in Latin America.

## F. Graduate Education and Research

The problems of graduate education and university research are primarily low cost-effectiveness in graduate education, low research productivity, and misallocation of resources in research. The policy prescriptions, again, are clear: consolidate graduate programs and improve research productivity by reallocating resources from faculty who don't do research to those who do.

To consolidate graduate programs will require careful evaluations of actual and potential program quality but, more importantly, will require closing programs having low potential. Reallocation of resources requires changing both the myth as to what faculty do or should do as well changing teaching loads. Both closing graduate programs and increasing teaching loads are likely to be very difficult politically. In the case of graduate programs, published program evaluations could influence student demand sufficiently to effectively close low quality programs. In the case of research resources, faculty salaries could be kept at their current low levels, with the expectation that for that pay faculty will effectively work part-time and that work will consist of teaching. Productive researchers could then be given reduced teaching loads and salary overloads tied to research project funding. This policy would clearly work to the disadvantage of faculty who do research but in areas for which funding is not readily available.

## G. Conclusions

Latin American higher education provides a textbook example where problems are evident and desirable public policies (from the economic perspective at least) are quite easily determined, but the design of strategies to successfully implement those policies is sometimes extremely difficult. There are a number of large constraints--political and institutional--to implementing policy changes, but there are, also, a number of examples where policy changes have been made or are being made in spite of those constraints. These successes give hope for larger scale policy changes to improve efficiency and equity in higher education.

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111/ The exception is the use of CAPES program evaluations in funding graduate level education in Brazil.

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## Annex I.1

### Higher Education Enrollments by Country Over Time (in 000s)

| Country | 1950 | 1960 | 1970 | 1980 | 1985 |
|---|---|---|---|---|---|
| Argentina | 85.2 | 180.8 | 274.6 | 491.5 | 846.1 |
| Bolivia | 5.0 | 12.0 | 35.3 | 60.9 2/ | 56.6 |
| Brazil | 51.1 | 95.7 | 430.5 | 1,409.2 2/ | 1,479.4 3/ |
| Colombia | 10.0 | 22.7 | 85.6 | 271.6 | 391.5 |
| Costa Rica | 1.5 | 4.7 | 15.5 | 55.6 | 60.3 4/ |
| Chile | 9.5 1/ | 25.5 | 78.4 | 145.5 | 196.9 |
| Ecuador | 4.1 | 9.4 | 38.7 | 269.8 | 280.6 |
| El Salvador | 1.2 | 2.4 | 9.5 | 16.8 | 57.4 3/ |
| Guatemala | 2.4 | 5.2 | 15.6 | 50.9 2/ | 47.4 |
| Guyana | n.a. | 0.2 | 1.1 | 2.5 | 2.1 3/ |
| Honduras | 0.8 | 1.7 | 4.0 | 25.8 | 33.7 4/ |
| Mexico | 35.2 | 78.0 | 247.6 | 897.7 | 1,207.8 |
| Nicaragua | 0.6 | 1.4 | 9.4 | 35.3 | 29.0 |
| Panama | 1.5 | 4.0 | 8.2 | 40.4 | 52.2 4/ |
| Paraguay | 1.7 | 3.4 | 8.2 | 26.9 | 33.2 4/ |
| Peru | 16.1 | 31.0 | 126.2 | 306.4 | 305.4 |
| Dominican Republic | 2.3 | 3.4 | 23.5 | 42.4 2/ | 139.3 |
| Surinam | n.a. | 0.4 | 0.3 | 2.4 | 2.9 4/ |
| Trinidad & Tobago | 0.2 | 0.5 | 2.4 | 5.6 2/ | 5.5 |
| Uruguay | 11.7 | 15.4 | n.a. | 36.3 | 77.5 |
| Venezuela | 6.9 | 26.5 | 100.8 | 307.1 | 443.1 |

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1/ 1949
2/ 1978
3/ 1983
4/ 1987

Sources: Unesco Statistical Yearbook, 1987; 1972; 1964.

## Annex I.2

### Higher Education Enrollment Rates by Country

| Country | 1960 | 1970 | 1980 | 1985 |
|---|---|---|---|---|
| Argentina | 11.0 | 13.8 | 21.6 | 36.4 |
| Bolivia | 3.6 | 8.6 3/ | 16.5 | 19.5 1/ |
| Brazil | 1.6 | 5.3 | 11.9 | 11.3 2/ |
| Chile | 4.0 | 9.3 | 13.0 | 15.0 |
| Colombia | 1.8 | 4.8 | 10.6 | 13.0 |
| Costa Rica | 4.8 | 10.4 | 23.0 | 23.0 |
| Domincan Republic | 1.3 | 5.3 | 3.9 | 13.8 |
| Ecuador | 2.6 | 7.7 | 36.5 | 33.1 1/ |
| El Salvador | 1.1 | 3.4 | 8.4 | 8.4 |
| Guatemala | 1.7 | 3.6 | n.a. | n.a. |
| Guyana | 0.4 | 1.9 | 2.6 | 2.1 1/ |
| Honduras | 1.0 | 2.2 | 8.2 | 9.5 |
| Mexico | 2.6 | 5.8 | 14.1 | 16.0 |
| Nicaragua | 1.2 | 5.7 | 14.1 | 9.8 |
| Panama | 4.5 | 6.6 | 22.0 | 25.9 |
| Paraguay | 2.6 | 3.7 | 8.8 | 9.7 1/ |
| Peru | 3.6 | 10.6 | 19.4 | 24.0 |
| Surinam | n.a. | n.a. | 7.0 | 6.9 1/ |
| Trinidad & Tobago | 0.8 | 2.9 | 4.9 | 4.2 |
| Uruguay | 7.8 | 8.4 | 16.1 | 31.7 |
| Venezuela | 4.0 | 10.9 | 21.4 | 26.4 |

1/ 1984
2/ 1983
3/ 1973

Note: Enrollment rates represent the ratio of higher education enrollments to size of the 20-24 year old population.

Sources: Unesco Statistical Yearbook, 1987; 1972; 1975.

Annex I.3

## Spending on Higher Education on a Percentage of Total Education Spending

| Country | 1960 | 1970 | 1980 | 1985 |
|---|---|---|---|---|
| Argentina | n.a. | 21.0 | 22.7 | 19.2 2/ |
| Bolivia | n.a. | 15.4 4/ | 17.1 | n.a. |
| Brazil | 20.1 | n.a. | 18.9 | 20.8 2/ |
| Chile | 21.0 7/ | 37.9 5/ | 33.2 | 20.3 |
| Colombia | 16.9 7/ | 23.9 | 24.1 | 22.2 |
| Costa Rica | n.a. | 10.4 4/ | 26.1 | 41.4 |
| Cuba | n.a. | n.a. | 6.9 | 12.9 |
| Dom. Republic | 16.5 8/ | 21.3 | 23.9 | 20.8 |
| Ecuador | 21.9 7/ | n.a. | n.a. | 17.8 |
| El Salvador | n.a. | 21.4 | 14.2 | n.a. |
| Guatemala | n.a. | 13.1 | n.a. | 19.7 1/ |
| Guyana | 1.0 | 14.7 | 15.2 3/ | 17.8 |
| Honduras | n.a. | 11.9 | 19.3 | 26.5 1/ |
| Mexico | n.a. | 10.4 | 26.5 | 29.2 |
| Nicaragua | n.a. | 10.0 | 10.5 | 23.2 |
| Panama | 7.4 | 10.8 | 13.4 | 20.4 |
| Paraguay | 20.0 8/ | 16.5 | n.a. | 23.8 |
| Peru | 10.9 8/ | 15.7 6/ | 25.2 | 34.3 2/ |
| Surinam | n.a. | n.a. | 7.4 | n.a. |
| Uruguay | n.a. | 19.0 | 16.1 | 22.4 |
| Venezuela | n.a. | 25.5 | 39.2 | 43.4 |

Source: Unesco, Statistical Yearbook, 1987, 1974 and 1964.

1/ 1982
2/ 1984
3/ 1979
4/ 1968
4/ 1969
6/ 1971
7/ 1961
8/ 1962

## Annex I.4

### Total Education and Higher Education Expenditures by country, 1960 - 1985 (in constant US$)

| | Total Education Expenditures | | | Higher Education Expenditures | | |
|---|---|---|---|---|---|---|
| Country | 1970 | 1980 | 1985 | 1970 | 1980 | 1985 |
| Argentina | 1,232 | 3,347 | 3,802 | 213 | 1,148 | 1,287 |
| Brazil (Federal Universities only) | 2,730 | 2,085 | 1,387 | 1,067 | 1,251 | 442 |
| Chile | 1,244 | 1,524 | 655 | 487 | 506 | 143 |
| Colombia | 226 | 745 | 1,235 | 54 | 180 | 274 |
| Mexico | 1,551 | 6,509 | 4,343 | 156 | 1,725 | 1,550 |
| Venezuela | 919 | 3,346 | 2,454 | 340 | 1,312 | 1,065 |

Sources: IMF Government Finance Statistics, 1986; 1982.
Unesco Statistical Yearbook, 1987; 1984; 1982; 1974.
Brazil, Ministerio da Educacao (1985).

Note; All data are in millions of 1985 U.S. dollars. Data in the 1970 column for Chile are from 1973.

Data in the 1985 column for Argentina, Brazil and Venezuela are for 1984.

1970 data on Brazil Higher Education Expenditure is for all universities. 1980 and 1985 data are for federal universities only.

## Annex I.5

### Private Share in Latin American Higher Education by Country, 1960-1985
(Number in thousands and percentage of total)

| | 1960 | | 1970 | | 1980 | | 1985 | |
|---|---|---|---|---|---|---|---|---|
| | # | % | # | % | # | % | # | % |
| Argentina | 3.6 | 2 | 46.7 | 17 | 108.1 | 22[1] | 135.4 | 16 |
| Bolivia | 0.1 | 1 | 1.1 | 3 | 1.8 | 3[2] | | |
| Brazil | 42.1 | 44 | 236.8 | 55 | 887.8 | 63 | 556.7 | 59 |
| Chile | 9.4 | 37 | 26.7 | 34 | 53.8 | 37 | 56.0 | 33[3] |
| Colombia | 9.3 | 41 | 39.4 | 46 | 171.1 | 63 | 238.8 | 61[3] |
| Costa Rica | 0 | 0 | 0 | 0 | 4.4 | 8[1] | | |
| Cuba | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Dominican Republic | 0 | 0 | 5.4 | 23 | 19.5 | 46[1] | | |
| Ecuador | 0.8 | 8 | 8.1 | 21 | 40.5 | 15 | | |
| El Salvador | 0 | 0 | 2.5 | 26 | 2.0 | 12[5] | | |
| Guatemala | 0 | 0 | 2.8 | 18 | 11.7 | 23 | | |
| Honduras | 0.2 | 10 | 0.2 | 6 | 0.8 | 3[4] | | |
| Mexico | 10.9 | 14 | 37.1 | 15 | 116.7 | 13 | 205.3 | 17[3] |
| Nicaragua | 0 | 0 | 3.7 | 39 | 12.0 | 34[5] | | |
| Panama | 0 | 0 | 0.6 | 7 | 2.4 | 6[5] | | |
| Paraguay | 0.1 | 2 | 2.1 | 25 | 9.1 | 34[5] | | |
| Peru | 3.4 | 11 | 27.8 | 22 | 82.7 | 27 | 97.7 | 32 |
| Uruguay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
| Venezuela | 2.9 | 11 | 11.1 | 11 | 36.9 | 12 | 75.3 | 17 |

[1] 1979
[2] 1978
[3] 1984
[4] 1981
[5] 1977

Annex I.6

## Higher Education Spending in Latin America
(in constant US$)

| | Higher Education Budget | | | Budget per Student | | |
|---|---|---|---|---|---|---|
| Country | 1970 | 1980 | 1985 | 1970 | 1980 | 1985 |
| Argentina | 213 | 1,148 | 1,287 | 938 | 2,983 | 1,913 |
| Brazil (Federal Universities only) | 1,067 | 1,251 | 442 | 5,508 | 3,950 | 1,353 |
| Chile | 487 | 506 | 143 | 9,408 | 5,350 | 1,077 |
| Colombia | 54 | 180 | 274 | 1,169 | 1,786 | 1,790 |
| Mexico | 156 | 1,725 | 1,550 | 741 | 2,261 | 1,268 |
| Venezuela | 340 | 1,312 | 1,065 | 3,791 | 4,910 | 2,921 |

Sources: IMF Government Financial Statistics
Unesco Statistical Yearbook
Brazil, Ministerio da Educacao (1985)

Note: All data are in 1985 prices. Budget amounts are in millions of U.S. dollars, while per student amounts are stated in single dollar amounts.

Data in the 1970 columns for Chile refer to 1973.

Date in the 1985 columns for Argentina, Brazil and Venezuela refer to 1984.

Also, note that per student amounts are based on enrollments in public higher education.

1970 data on Brazil for all universities. 1980 and 1985 data for federal universities only.

## Annex II.1

## An Accounting Structure for the Outputs of Higher Education

| Variables | Source of Measures |
|---|---|
| **Instructional Outputs** | |
| Cognitive Attibutes of Students: | |
| Level of General Knowledge | Test Scores |
| Level of Knowledge in Chosen Field | Test Scores |
| Basic Language Arts Skills | Test Scores |
| Critical Thinking and Reasoning | Test Scores |
| General Intelligence | Test Scores |
| Affective Attributes of Students: | |
| Self-concept | Questionnaire Responses |
| Satisfaction with Education Experience | Questionnaire Responses |
| Citizenship | Questionnaire Responses |
| Values | Questionnaire Responses |
| Achievement Motivation | Questionnaire Responses |
| Tangible Attributes of Students: | |
| Earning Power | Placement and Employment Data |
| Awards | Number and Stature of Awards |
| Affiliations | Number and Kind of Affiliations |
| Avocations | Number and Kind of Hobbies |
| G.P.A. | Academic Record Data |
| Level of Educational Attainment | Academic Record Data |
| Flexibility of Employment | Placement and Employment Data |
| Areas of Career Interest | Questionnaire Responses |

Annex II.1 (continued)

| Variables | Source of Measures |
|---|---|
| **Institutional Environment Outputs** | |
| Academic Environment Attribute: | |
| Rate of Student Success | Dropout Data |
| Mean Time to Reach Degree | Student Record Data |
| Faculty Turnover | Faculty Record Data |
| Faculty Availability to Students | Student Questionnaire |
| Academic Resources Available | Library Data |
| Quality of Instruction | Faculty and Student Questionnaire |
| Academic Aptitude Mix | Entering Student SAT Scores |
| Student Stress | Student Questionnaire |
| Faculty Stress | Faculty Questionnaire |
| Social Environment Attributes: | |
| Degree of Social Activity on Campus | Activity Records and Questionnaire |
| Racial Mix | Student and Faculty Records |
| Socio-Economic Mix | Student Records |
| Family Attitude Characteristics | Questionnaire |
| Social Involvement of Student Body | Questionnaire |
| Per cent Resident (on campus) Students | Housing and Student Records |
| Rate of Marriage Among Students | Student Records |
| Physical Environment | Physical Plant Data and Questionnaire |

## Research Outputs

| Variables | Source of Measures |
|---|---|
| Reorganization of Knowledge | Number of new books, textbooks, etc. |
| New Inventions and Developments (Applied Research Products) | Number of patents, adopted procedures, etc. |
| New Ideas and Concepts (Pure Research Outputs) | Number of Articles, papers, awards, citations, etc. |
| Personal Involvement of Students and Other (instruction spinoff) | Number of hours involvement on projects by students, industry, personnel, etc. |

Annex II.1 (continued)

| Variables | Source of Measures |
|---|---|
| **Public Service Outputs** | |
| Student Involvement in Community | Hours of time, type of project, questionnaire |
| Faculty Involvement in Community | Hours of time, type of project, questionnaire |
| Cultural Activities Available | Number, type, duration, attendance, participation |
| Recreation Activities Available | Number, type, duration, attendance, participation |
| Continuing Education Activities | Number, type, duration, enrollment, quality, and satisfaction, questionnaire |
| Social Criticism | Amount, frequency, intensity, effects of confrontation<br>- Students and Community<br>- Faculty and Community |
| Personal Services | Number of health care patients, counseling patients, psychological testing , legal advice requests, etc. (dollar value such services) |
| Indirect Community Benefits | Students available as employees, drawing power of the community as a place of residence for professional and skilled persons |
| Community Psychic Income | Public pride, awareness that expertise is available if needed |
| Product Testing and materials tested for | Number and types of products government and industry. |

Source: Western Interstate Commission on Higher Education

Annex II.2

## Input and Output Indicators Relating to University Quality

1. Characteristics of teaching staff, by faculty or academic program
    - a. Numbers, by rank, and full-time vs. part-time
    - b. Numbers holding advanced degrees
    - c. Numbers with national or international recognition

2. Student population, by faculty or academic program, 1981-83
    - a. Current enrollment, by sex
    - b. Attrition

3. Research projects completed, 1980-83
    - a. Number of projects
    - b. Their nature: whether related to basic science and whether of special local or national interest
    - c. Length of project
    - d. Unidisciplinary vs. multidisciplinary, by number of researchers
    - e. Student participation, by level
    - f. Source of finance
    - g. Resultant publications, by type
4. Research in progress, 1984, by the same characteritics

5. Scientific meetings sponsored during 1983, by type, duration, regional or national interest, and attendance

6. Characteristics of the curriculu, by faculty and specialization
    - a. Number of credits required for the bachillerato, by classroom and laboratory
    - b. Number of credits required for the professional degree
    - c. Composition of the curriculum by type of course (general culture, basic science, applied science and technology)
    - d. Average number of semesters required for completion, by type of degree
    - e. Whether thesis required, by type of degree
    - f. Interval between curriculum revisions

7. Programs in continuing education directed at the community, 1983

Continued......./

Annex II.2 (Continued)

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8. Physical plant: area under roof and state of maintenance
    - a. Classrooms
    - b. Laboratories
    - c. Libraries
    - d. Administrative Offices
    - e. Other, e.g., storehouses, cafeterias, auditoriums

9. Laboratories, pilot plants, museums, computer centers
    - a. Number
    - b. Condition of equipment
    - c. Relative sophistication of equipment
    - d. Frequency of use

10. Libraries
    - a. Number
    - b. Holdings, by books, theses, pamphlets
    - c. Number of subscriptions to journals
    - d. Maintenance of subscriptions over time

11. Contracts with outside organizations, national and international, by value
    - a. Research contracts
    - b. Development contracts
    - c. Service contracts

12. Institutional size

---

Source: World Bank (1985)

## Annex II.3

### Repeat Rates Among ICETEX Loan Recipients Over the 1969-1972 Period (percentages)

| | Repeat Rate |
|---|---|
| **Total** | 15 |
| Public Universities | 18 |
| Private Universities | 9 |
| **Family Income** | |
| 0 - 18000 | 9 |
| 18000 - 36000 | 6 |
| 36000 - 54000 | 23 |
| 54000 - 72000 | 22 |
| 72000 - 120000 | 23 |
| over - 120000 | 10 |
| **Academic Ability** | |
| 00 - 67 | 26 |
| 88 - 76 | 13 |
| 77 - 85 | 10 |
| 86 - 99 | 5 |

Source: Jallade (1974), Table 25

## Annex II.4

### Average Faculty Salaries, Argentina
### (1985 Australes)

| Year | Salary | Index |
|---|---|---|
| 1976 | 325 | 100.0 |
| 1977 | 532 | 163.2 |
| 1978 | 722 | 221.5 |
| 1979 | 746 | 220.8 |
| 1980 | 1013 | 310.7 |
| 1981 | 906 | 277.9 |
| 1982 | 511 | 156.7 |
| 1983 | 442 | 135.6 |
| 1984 | 592 | 181.6 |
| 1985 | 334 | 102.5 |

Source: Argentina: Fundacion de Investigaciones Economicas Latinoamericanas (FIEL) (1986)

## Annex II.5

### Average Costs in Public and Private Peruvian Universities, 1984 (in current dollars)

| | San Marcos | Other Public | Catolica | Other Private |
|---|---|---|---|---|
| Enrollment, 1983 | 43 866 | 164,503 | 21,769 | 8,266 |
| Graduates, 1983 | 1,731 | 10,998 | 1,156 | 208 |
| Yield, Graduates to Enrollment | 3.95% | 6.68% | 5.31% | 2.52% |
| Budget, 1984 (000s) | 12,197 | 72,472 | 5,567 | 7,679 |
| Average Cost per Student | $ 278 | $ 440 | $ 794 | $ 353 |

Source: World Bank data.

## Annex II.6

### Total and Average Revenues of Public and Private Universities in Colombia, 1970 (in thousands of pesos)

| | Public Universities | Private Universities |
|---|---|---|
| Total University Revenue | 776,6000 | 269,400 |
| Total Revenue from Tuition Fees | 37,800 | 187,000 |
| Tuition Fees as Percentage of Total Revenue | 4.9 | 69.4 |
| Number of Students Enrolled | 46,618 | 38,942 |
| Average Revenue per Student | 16,659 | 6,918 |
| ICETEX Loan-Financed Tuition Fees as Percentage of Total Revenue From Tuition Fees | 5.1 | 8.6 |

Sources: Jallade (1974), Table 9, and Unesco Statistical Yearbook.

## Annex II.7

### Average Costs in Public and Private Mexican Universities, 1976
(in current pesos)

| Institution | Expenditure (in thousands) | Enrollment | Cost Per Student | Subsidy Per Student |
|---|---|---|---|---|
| Comprehensive Public (UANL) | 223,468 | 25,431 | 8,747 | 6,018 |
| Comprehensive Public (UAA) | 11,765 | 1,189 | 9,895 | 4,807 |
| Normal, State (NBNL) | 5,127 | 2,400 | 2,136 | 557 |
| Private Comprehensive (UDEM) | 27,770 | 1,974 | 14,068 | 0 |
| Technical Federal (ITRA) | 5,305 | 358 | 14,341 | 14,341 |

Source: Quintero, (1978), Table 4

## Annex II.8

## Guidelines for Self-Assessment of Academic Programs

1. A clear definition of the goals of the assessment, as distinct from the goals of the specific area being assessed, should be made. The main focus of assessment should be an evaluation of educational quality as measured by goal-oriented outcomes;

2. All persons who are affected and interested in the programs under review should be continually made aware of and often involved in the assessment process. Responsibility for setting priorities, designing the assessment process. Responsibility for setting priorities, designing the assessment, collecting and analyzing data, and evaluating and using them should be assigned to appropriately skilled persons;

3. A determination of how well the goals of the specific area assessed are being met should be made. The appropriate instruments and techniques must be selected and administered to the constituencies involved (for example, administrators, faculty, studients, graduates, employers, and outside groups);

4. The process of collecting data should be established in such a way that it can continue behyond the first self-assessment as a routine function of the master planning and decision-making process;

5. Analysis of data, reporting of findings, and recommendations for action should be carefully monitored by the person(s) responsible for the self-assessment. Periodic follow-up of recommendations is essential to determine if any actual results have occurred;

6. Essential to effective self-assessment is the periodic evaluation of the system itself. The system should be cost-effective in both dollars and human time spent to provide vital information for decision-making.

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Source: New York State Department of Education, (1979), pp 5-6.

## Annex II.9

### Colombia - Higher Education Institutions: Distribution of Expenditure

| | Personal Services | Transfers | General Expendi-tures | Debt | Invest-ment | Total |
|---|---|---|---|---|---|---|
| National University | 1,341<br>(74.1) | 149<br>(8.0) | 217<br>(12.0) | 72<br>(4.0) | 30<br>(1.7) | 1,809 |
| Other National Universities | 1,233<br>(64.1) | 241<br>(12.5) | 109<br>(10.3) | 102<br>(5.3) | 149<br>(7.8) | 1,924 |
| Departmental Universities | 2,706<br>(64.8) | 625<br>(12.0) | 403<br>(9.6) | 407<br>(9.8) | 135<br>(3.2) | 4,176 |
| Public Universities a/ | 5,279<br>(66.8) | 915<br>(11.6) | 819<br>(10.3) | 581<br>(7.3) | 314<br>(4.0) | 7,908 |
| Private Universities b/ | 1,702<br>(64.7) | 57<br>(2.2) | 503<br>(19.1) | 82<br>(3.1) | 286<br>(10.9) | 2,630 |
| Total National | 6,981<br>(66.2) | 972<br>(9.2) | 1,322<br>(12.6) | 663<br>(6.3) | 600<br>(5.7) | 10,538 |

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Source: Rodriguez and Franco, (1980).

a/ Includes all public universities except military schools.

b/ Includes 39 higher education institutions which represents 69.8% of the total enrollments in the private sector.

## Annex III.1

### Colombia - Higher Education Graduates Unemployment Rates
(Percent)

| | | 1976 | 1980 | 1985 |
|---|---|---|---|---|
| Males: | 20-29 Years old | 11.6 | 9.4 | 14.8 |
| | 30-39 | 0.6 | 2.9 | 5.0 |
| | 40-49 | 0.6 | 0.6 | 1.8 |
| | 50-59 | 0.0 | 0.0 | 2.1 |
| Females: | 20-29 years old | 14.4 | 9.2 | 19.4 |
| | 30-39 | 5.5 | 3.2 | 9.3 |
| | 40-49 | 0.0 | 0.0 | 0.0 |
| | 50-59 | | | 4.0 |
| Completed Higher Education | | 2.3 | 3.0 | 6.5 |
| Uncompleted Higher Education | | 12.2 | 16.4 | 16.6 |

Source: Ocampo (1986), Table 5.

## Annex III.2

### Underemployment Among Graduates of Public and Private Universities in Brasilia, Cohorts of 1972, 1975, and 1978 (percentages)

| | Underemployment Rate | |
|---|---|---|
| Field/University | 1972/75 Cohort | 1978 Cohort |
| All Graduates | 51 | 65 |
| Administration | 60<br>(9) | 63 |
| Economics | 56<br>(10) | 61 |
| Law | 47<br>(17) | 70 |
| Pedagogy | 41<br>(16) | 63 |
| Public University (University of Brasilia) | 56 | |
| Private University (Associacao de Ensino Unificado do Distrito Federal) | 60 | |

Note: Numbers in parentheses represents the percentage of the group reporting voluntary underemployment.

Source: Adapted from Velloso and Bastos (1984)

Annex III.B

## Higher Education Distribution of Students by Field of Study

| Country | School Year Beginning | Total | Human-nities | Educa-tion | Fine Arts | Law | Social Sciences | Commer. & Bus. Adm. | Home Econ. | Service Trade | Natural Sciences | Math & Comp. Sciences | Engrg. | Medical Sciences | Archit. | Argic. | Not Specified |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 1980 | 491,473 | 24,738 | 84,727 | 7,214 | 80,981 | 10,749 | 74,953 | | | 18,877 | 20,022 | 68,861 | 57,480 | 29,920 | 25,034 | 7,927 |
| | 1982 | 408,978 | 28,178 | 7,881 | 4,194 | 59,165 | 10,075 | 78,648 | | | 22,969 | 20,849 | 69,323 | 51,112 | 30,320 | 23,488 | |
| Bolivia | 1978 | 44,948 | 800 | 401 | 122 | 8,482 | 5,844 | | | | 887 | | 8,970 | 9,682 | | 504 | 14,504 |
| | 1982 | 56,832 | 1,843 | 388 | 77 | 6,239 | 1,107 | 18,529 | | | 720 | 884 | 12,179 | 11,148 | 3,058 | 3,006 | 98 |
| Brazil | 1978 | 1,251,118 | 28,132 | 398,431 | 8,848 | 183,829 | 93,579 | | | | 14,731 | | 181,146 | 104,298 | | 33,324 | 295,098 |
| | 1982 | 1,436,287 | 84,220 | 329,706 | 17,085 | 186,388 | 188,337 | 209,418 | 8,742 | 4,480 | 68,402 | 24,371 | 189,153 | 118,977 | 24,861 | 35,482 | 87,741 |
| Chile | 1981 | 120,101 | 11,284 | 12,239 | 4,797 | 2,247 | 1,281 | | | | 8,929 | | 34,213 | 12,945 | | 3,146 | 29,020 |
| Colombia | 1981 | 318,293 | 2,098 | 88,188 | 8,272 | 80,090 | 18,284 | | | | 8,211 | | 59,300 | 33,331 | | 11,141 | 101,800 |
| | 1983 | 378,999 | 3,899 | 69,808 | 7,868 | 44,248 | | 108,083 | | | 5,727 | | 88,948 | 40,258 | | 12,984 | |
| Costa Rica | 1980 | 50,812 | 7,947 | 8,838 | 924 | 2,428 | 4,822 | 5,778 | | | 1,952 | 2,088 | 4,219 | 2,824 | 1,161 | 3,169 | 8,785 |
| | 1982 | 54,384 | 15,105 | 5,891 | 1,081 | 2,511 | 4,516 | 4,711 | | 39 | 1,611 | 2,129 | 4,177 | 2,742 | 1,259 | 2,453 | 5,149 |
| Cuba | 1980 | 151,733 | 2,798 | 80,942 | 902 | 3,175 | 1,727 | 18,340 | | | | 1,475 | 18,893 | 15,559 | 4,878 | 14,538 | 7,720 |
| | 1982 | 173,403 | 2,835 | 72,848 | 938 | 2,924 | 8,036 | 7,351 | | | 2,498 | 1,875 | 21,573 | 20,645 | 5,250 | 15,169 | 12,048 |
| Dom. Rep. | 1978 | 42,412 | 222 | 6,710 | 888 | 1,358 | 2,645 | | | | 911 | | 7,308 | 10,054 | | 1,119 | 11,702 |
| Ecuador | 1981 | 258,054 | 10,252 | 48,837 | 1,239 | 13,396 | 23,148 | | | | 2,667 | | 52,942 | 32,686 | | 14,799 | 58,088 |
| El Salvador | 1980 | 16,888 | 158 | 898 | 339 | 592 | 1,959 | 4,198 | | 99 | 29 | | 8,308 | 479 | 945 | 483 | 551 |
| | 1983 | 57,374 | 1,025 | 9,074 | 357 | 3,281 | 4,371 | 14,284 | 74 | 117 | 344 | 205 | 10,682 | 8,679 | 2,259 | 1,940 | 2,702 |
| Guatemala | 1979 | 47,555 | 4,838 | 4,058 | 107 | 6,177 | 1,968 | | | | 1,189 | | 5,197 | 5,496 | | 2,978 | 15,549 |
| Haiti | 1979 | 3,801 | | 328 | | 838 | 620 | | | | | | 548 | 1,022 | | 152 | 293 |
| Honduras | 1980 | 25,825 | 204 | 491 | 16 | 2,222 | 3,345 | 6,171 | 61 | | 232 | 215 | 8,389 | 4,432 | | 707 | 1,340 |
| | 1983 | 34,468 | 178 | 1,848 | 31 | 3,087 | 4,985 | 7,293 | 102 | | 696 | 790 | 6,319 | 5,307 | | 3,133 | 901 |
| Mexico | 1981 | 840,368 | 10,739 | 9,789 | 6,937 | 69,808 | 58,517 | | | | 22,212 | | 177,083 | 147,948 | | 82,905 | 254,435 |
| | 1983 | 939,513 | 10,632 | 11,806 | 8,647 | 101,280 | 83,728 | 181,465 | | 11,409 | 24,242 | 12,917 | 257,537 | 133,685 | 39,298 | 39,049 | 24,119 |
| Panama | 1981 | 50,185 | 8,644 | 4,206 | 645 | 1,917 | 2,840 | | | | 1,369 | | 16,060 | 3,417 | | 936 | 15,152 |
| Paraguay | 1978 | 20,812 | 354 | 404 | 311 | 3,208 | 633 | | | | 938 | | 1,593 | 1,915 | | 1,108 | 10,348 |
| Peru | 1980 | 306,353 | 3,513 | 23,314 | 441 | 14,534 | 37,388 | 78,026 | 1,425 | 403 | 8,373 | 4,201 | 53,338 | 23,781 | 5,049 | 24,081 | 30,486 |
| | 1982 | 305,390 | 2,278 | 24,034 | 159 | 5,659 | 15,471 | 20,335 | 477 | 1,283 | 10,414 | 5,680 | 57,718 | 27,913 | 5,253 | 20,738 | 107,980 |
| Uruguay | 1981 | 36,706 | 545 | 215 | 234 | 12,441 | 1,565 | | | | 1,522 | | 1,551 | 7,511 | | 3,322 | 7,800 |
| | 1983 | 50,151 | 1,500 | 550 | 203 | 11,598 | 3,428 | 9,888 | | | 3,472 | 1,410 | 3,179 | 9,801 | | 4,315 | 1,027 |
| Venezuela | 1980 | 307,133 | 3,478 | 44,875 | 410 | 18,975 | 21,899 | 42,286 | | 1,419 | 5,912 | 6,221 | 51,306 | 35,650 | 5,858 | 12,813 | 56,231 |
| | 1982 | 349,773 | 3,897 | 51,373 | 516 | 23,395 | 28,095 | 49,673 | | 1,105 | 6,401 | 7,528 | 62,074 | 40,585 | 6,210 | 14,740 | 54,181 |

Source: Unesco Statistical Yearbook (1985) Table 3.12

## Annex III.4

## Educational Composition of the Labor Force

| | | ------------------------% Labor Force With------------------------ | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | No | Primary | | Secondary | | | Mean Years of |
| Country | Year | Education | Incomplete | Complete | Incomplete | Complete | Higher | of Schooling |
| Argentina | 1960 | 7.0 | 35.4 | 38.2 | 5.7 | 9.9 | 3.7 | 6.2 |
| | 1980 | 4.7 | 24.9 | 34.8 | 17.7 | 9.5 | 8.4 | 7.4 |
| Brazil | 1960 | 48.2 | 45.1 | 3.4 | 2.3 | 0.4 | 0.5 | 2.4 |
| | 1980 | 24.7 | 35.3 | 7.9 | 19.6 | 6.6 | 5.9 | 5.6 |
| Chile | 1960 | 18.6 | 36.0 | 20.5 | 11.3 | 11.2 | 2.3 | 5.9 |
| | 1981 | 4.1 | 32.2 | 18.8 | 24.4 | 12.2 | 8.3 | 8.1 |
| Colombia | 1951 | 42.3 | 41.7 | 8.0 | 5.3 | 1.7 | 1.0 | 2.2 |
| | 1964 | 28.9 | 48.5 | 12.1 | 5.8 | 3.3 | 1.3 | 2.8 |
| | 1973 | 16.8 | 35.5 | 20.1 | 10.1 | 13.2 | 4.3 | 4.8 |
| | 1978 | 16.3 | 31.3 | 23.6 | 9.2 | 14.9 | 4.7 | 5.0 |
| Guatemala | 1964 | 63.6 | 27.0 | 5.1 | 2.6 | 0.6 | 1.1 | 1.7 |
| | 1973 | 51.7 | 12.7 | 28.1 | 2.6 | 3.5 | 1.4 | 3.0 |
| Honduras | 1961 | 53.3 | 33.3 | 8.2 | 2.0 | 2.6 | 0.7 | 2.1 |
| | 1974 | 42.3 | 27.2 | 21.6 | 3.6 | 3.9 | 1.4 | 3.0 |
| Mexico | 1970 | 23.6 | 43.5 | 17.0 | 6.3 | 5.5 | 4.1 | 4.2 |
| | 1977 | 26.9 | 28.8 | 26.9 | 8.9 | 3.2 | 5.2 | 4.5 |
| Panama | 1960 | 43.9 | 13.0 | 22.5 | 8.5 | 8.8 | 3.3 | 4.0 |
| | 1970 | 34.2 | 19.5 | 19.5 | 11.2 | 10.5 | 5.1 | 4.8 |
| | 1980 | 12.5 | 17.9 | 30.0 | 19.9 | 11.7 | 8.0 | 6.6 |
| Paraguay | 1972 | 10.5 | 62.2 | 11.2 | 7.6 | 5.9 | 2.6 | 4.3 |
| | 1982 | 8.1 | 39.4 | 26.4 | 15.4 | 6.9 | 3.8 | 5.6 |
| Peru | 1961 | 31.1 | 33.7 | 20.7 | 6.1 | 5.4 | 3.0 | 3.9 |
| | 1981 | 13.5 | 20.7 | 26.2 | 12.9 | 14.6 | 12.1 | 7.0 |
| Uruguay | 1963 | 8.8 | 44.8 | 24.5 | 14.7 | 3.7 | 3.4 | 5.1 |
| | 1975 | 5.1 | 33.8 | 29.2 | 12.3 | 7.3 | 12.4 | 6.7 |
| Venezuela | 1979 | 15.9 | 24.8 | 24.8 | 17.1 | 11.1 | 6.3 | 6.2 |
| | 1982 | 14.1 | 23.4 | 23.4 | 19.8 | 12.1 | 7.2 | 6.4 |

Source: Psacharopoulos & Arriagada (1986).

## Annex IV.1

## Access to Higher Education

|  | 1960 | 1970 | % in Final Yr of school | 1980 | % in Final Yr of school | 1985 | % in Final Yr of school |
|---|---|---|---|---|---|---|---|
| **Secondary Enrollment:** |  |  |  |  |  |  |  |
| Argentina | 575,154 | 974,826 | 16 | 1,366,494 | 15 | 1,800,549 | -- |
| Brazil | 1,177,427 | 4,083,586 | 13 | 2,819,182 | 24 | 2,951,624 | 23 |
| Chile | 228,491 | 302,064 | 14 | 538,309 | 17 | 667,797 | 16 |
| Colombia | 243,226 | 739,540 | 7 | 1,733,192 | 9 | 1,934,032 | 11 |
| Mexico | 512,216 | 1,483,856 | -- | 4,741,860 | 5 | 6,549,105 | 5 |
| Venezuela | 180,682 | 509,936 | 10 | 860,470 | 10 | 1,037,950 | 11 |

Note: Data for 1970 for Mexico refer to 1969. Data for 1980 for Argentina refer to 1979. Data for 1985 for Brazil refer to 1984.

| **University Graduates:** | 1960 | 1970 |  | 1980 |  | 1985 |  |
|---|---|---|---|---|---|---|---|
| Argentina | 9,731 | 23,991 |  | -- |  | -- |  |
| Brazil | 17,577 | 64,049 |  | 284,124 |  | 253,553 |  |
| Chile | 2,175 | 8,255 |  | 15,722 |  | 20,256 |  |
| Colombia | 1,907 | 7,454 |  | 28,573 |  | 48,736 |  |
| Mexico | 17,756 | 9,478 |  | 69,572 |  | 113,050 |  |
| Venezuela | 2,881 | 4,927 |  | 15,819 |  | 24,906 |  |

Note: Data in the 1970 column for Mexico, Colombia and Venezuela refer to 1969. Data in the 1980 column for Colombia refer to 1981. Data in the 1985 column refer to 1987 for Brazil and 1984 for Chile.

15-19 Year Old Population

|  | 1960 | 1970 | 1980 | 1985 | 2000 | 2010 |
|---|---|---|---|---|---|---|
| Latin Amer. | 20,946,000 | 29,510,000 | 39,785,000 | 42,761,000 | 54,305,000 | 57,270,000 |
| Argentina | 1,685,848 | 2,098,700 | 2,335,000 | 2,449,000 | 3,463,000 | 3,292,000 |
| Brazil | 7,142,443 | 10,253,283 | 13,758,000 | 13,924,00 | 17,463,000 | 18,690,000 |
| Chile | 724,807 | 913,465 | 1,201,000 | 1,159,000 | 1,240,000 | 1,236,000 |
| Colombia | 1,766,040 | 2,653,712 | 3,285,000 | 3,285,000 | 3,435,000 | 3,817,000 |
| Mexico | 3,535,265 | 5,064,391 | 7,661,000 | 9,029,000 | 11,630,000 | 12,805,000 |
| Venezuela | 679,636 | 1,219,982 | 1,757,000 | 1,871,000 | 2,548,000 | 2,581,000 |

Note: Data in the 1960 and 1970 columns for Colombia and Venezuela refer to 1964 and 1973, and 1961 and 1971, respectively.

Source: Unesco *Statistical Yearbook*, 1987; 1984; 1983; 1974; 1972; 1964.
World Bank, *World Population Projections 1987/88*.
U.N. *Demographic Yearbook, Historical Supplement*, 1979.

## Annex IV.2

### Female Enrollment and Minimum Admission Scores by University Field of Study, Chile, 1972 (Percentages)

| Field of Study (In Order of Percent Female) | Female Enrollment | Percent of all Enrolled Males | Percent of all Enrolled Females | Lowest Test Score Admitted | |
|---|---|---|---|---|---|
| Engineering | 6.3 | 18.3 | 2.0 | 616 | |
| Agronomy and | | | | 560 | |
| Veterinary medicine | 14.6 | 5.0 | 1.4 | 589 | |
| Economics and finance | 19.2 | 11.5 | 4.4 | 647 | |
| Natural science (except chemistry) | 22.8 | .9 | .4 | 655<br>611 | (biochemistry)<br>(biology) |
| Law | 25.2 | 4.8 | 2.6 | 533 | |
| Medicine | 27.1 | 4.4 | 2.6 | 713.5 | |
| Architecture | 30.1 | 3.0 | 2.0 | 557 | |
| Chemistry | 37.8 | .8 | .7 | 557 | |
| Dentistry | 43.4 | 1.2 | 1.5 | 638 | |
| Pharmacy | 45.6 | .7 | .9 | 599 | |
| Education | 60.9 | 19.8 | 49.3 | 501<br>501<br>477 | (pedagogy)<br>(preschool)<br>(primary) |
| Social sciences (except economics) | 67.6 | 3.1 | 10.1 | 573<br>568<br>538 | (political science)<br>(anthropology)<br>(sociology) |
| Nursing | 90.2 | 1.0 | 13.3 | 502 | |

Source: Schiefelbein and Farrell (1980), p S169.

## Annex IV.3

### Admissions to Higher Education Institutions by Income Class, Venezuela, 1985-86 (percentage distribution)

| Family Inome Class | University | | Pedagogical | Technological Institute | | Military |
|---|---|---|---|---|---|---|
| | Public | Private | Institute | Public | Private | Institute |
| High | 7.7 | 25.5 | 1.5 | 2.3 | 6.6 | 7.6 |
| Middle | 64.5 | 69.1 | 58.7 | 58.3 | 81.0 | 19.1 |
| Low | 25.5 | 5.5 | 36.8 | 35.2 | 11.8 | 29.3 |
| Marginal | 2.4 | 0.1 | 3.1 | 4.2 | 0.5 | 2.2 |

Note: Information on military institutes is for 1984-85 admissions.

Sources: Venezuela, Consejo Nacional de Universidades (1987)

Annex V.1

## Projections of Higher Education Enrollments & Expenditures

Estimates of secondary education enrollments in each country and in Latin America as a whole were prepared under two scenarios: First, that the 1985 secondary participation rates (calculated as secondary enrollment/ size of 15-19 year old age group) remained constant; and second, that the 1985 enrollment ratios grew at a 1.5 percent compounded annual rate until 2000 and 2010 (at 1.5 percent until 2000.

Estimates of higher education enrollments were also prepared under two scenarios: First, assuming that the 1985 higher education participation rates remained constant; and second, that the ratio of secondary to higher education enrollments remained constant but that secondary enrollments grew at a 1.5 percent annual compound rate.

Estimates of aggregate costs were based on the unit costs per student in public higher education at 1980 and 1985 cost levels. These unit costs were each multiplied by the two estimates for enrollment in 2000, after adjusting them on the assumption that the 1985 level of private higher education enrollments remained constant. This yields four estimates of total costs for the year 2000. (1980 and 1985 unit costs times high and low estimates of enrollment). The number of parentheses under each cost estimate is the percentage change from 1980 levels. Information on higher education expenditures for 1985 was unavailable for all of Latin America. The estimates for Latin America as a whole is arrived at by assuming unit costs in Latin America changed by the same amount as was true for a weighted average of countries (Argentina, Brazil, Chile, Colombia, Mexico and Venezuela) for which 1985 data were available.

## Annex V.2

### Size of 20-24 Year Old Population

| Country | 1960 | 1970 | 1985 | 2000 | 2010 |
|---|---|---|---|---|---|
| Argentina | 1,531,120 | 1,950,500 | 2,324,000 | 3,194,000 | 3,348,000 |
| Bolivia | 246,374 | 411,710 | 556,000 | 864,000 | 1,083,000 |
| Brazil | 6,160,742 | 8,285,805 | 13,608,000 | 16,179,000 | 18,494,000 |
| Chile | 598,399 | 769,036 | 1,201,000 | 1,250,000 | 1,253,000 |
| Colombia | 1,417,375[1] | 2,060,955[2] | 3,040,000 | 3,463,000 | 3,655,000 |
| Ecuador | 378,530[3] | 580,708[4] | 874,000 | 1,275,000 | 1,577,000 |
| Guyana | 42,157 | 56,635 | 91,000 | 90,000 | 94,000 |
| Paraguay | 144,916[3] | 191,292[5] | 361,000 | 488,000 | 652,000 |
| Peru | 848,190[6] | 1,150,589[5] | 1,756,000 | 2,244,000 | 2,653,000 |
| Suriname | 22,895[1] |  | 46,000 | 38,000 | 61,000 |
| Uruguay | 192,600[7] | 204,599[8] | 245,000 | 265,000 | 277,000 |
| Venezuela | 618,411[6] | 962,525[9] | 1,681,000 | 2,265,000 | 2,594,000 |
| Costa Rica | 103,432[7] | 167,123[2] | 278,000 | 317,000 | 356,000 |
| Dominican Rep. | 256,690 | 328,715 | 666,000 | 798,000 | 968,000 |
| El Salvador | 214,829[6] | 296,212[9] | 394,000 | 688,000 | 773,000 |
| Guaemala | 351,939[1] | 470,272[2] | 851,000 | 1,063,000 | 1,435,000 |
| Honduras | 157,767[6] | 228,438[4] | 386,000 | 641,000 | 874,000 |
| Mexico | 2,947,072 | 4,032,341 | 7,507,000 | 10,812,000 | 12,643,000 |
| Nicaragua | 122,193[7] | 155,165[9] | 299,000 | 485,000 | 608,000 |
| Panama | 90,660 | 125,339 | 210,000 | 269,000 | 274,000 |
| Latin America | 17,933,000 | 24,034,000 | 33,705,000 | 48,878,000 | 55,781,000 |

Sources: UN Demographic Yearbook, Historical Supplement 1979.
UNESCO Statistical Yearbook, 1987; 1974.
World Bank, World Population Projections, 1987-88 ed.

[1] 1964
[2] 1973
[3] 1962
[4] 1974
[5] 1972
[6] 1961
[7] 1963

## Annex V.3

## Finance and Resource Data for Brazilian Catholic Universities, 1986

| Sources of Finance (millions of CZ of 1986) | All Universities | Rio de Janeiro |
|---|---|---|
| Total revenues | 1,819.2 | 229.3 |
| Contracts | 212.5 | 135.6 |
| Tuition | 1,062.9 | 54.1 |
| SESU (direct government support) | 57.8 | |
| Fees | 25.0 | |
| Misc. (principally hospital revenues) | 389.8 | |
| Donations and contributions | 15.5 | |
| Enrollment: | | |
| Total enrollment | 205,054 | |
| Humanities | 121,054 | |
| Science & Technology | 42,424 | |
| Biological Science | 24,105 | |
| University Personnel: | | |
| Total faculty | 13,007 | 904 |
| with masters degree | 18.4% | |
| with doctorate | 7.9% | |
| full time | 16.5% | 24.9% |
| part time | 83.5% | |
| Total administrators | 12,629 | |
| Tuition and Costs: | | |
| Annual tuition | 5,056 | 7,319 |
| Expenditures per student | 10,385 | 31,893 |
| Expenditures on personnel per student | 6,132 | 7,191 |
| Materials and supplies (CCC) | 4,225 | 24,701 * |

* This figure reflects expenditures under contract with the government.

Note: For comparison, tuition at the Universidad Metropolitana de Piraciciba was CZ 9,458.

Source: Special IPEA survey of confessional institutions, 1987.

## Annex VI.1

### Scientists and Engineers in Work Force and Engaged in R & D (per million inhabitants)

| Country | Year | Work Force (1) | R & D (2) | Percent (2)/(1) | R & D as Percentage of GNP |
|---|---|---|---|---|---|
| **Latin America** | | | | | |
| Argentina | 1982 | 18,970 | 368 | 1.9 | 0.4 |
| Bolivia | 1976 | 11,562 | - | - | - |
| Brazil | 1982 | 11,231 | 256 | 2.2 | 0.6 |
| Chile | 1983 | - | 272 | - | 0.3 |
| Colombia | 1982 | - | 40 | - | 0.1 |
| Costa Rica | 1082 | - | 172 | - | 0.1 |
| Ecuador | 1979 | - | 259 | - | 0.4 |
| Guatemala | 1984 | - | 348 | - | 0.5 |
| Peru | 1981 | 16,872 1/ | 281 1/ | 1.7 1/ | 0.3 |
| Venezuela | 1982 | 23,096 1/ | 304 1/ | 1.3 1/ | 0.4 |
| **Developing Countries** | | | | | |
| Korea | 1983 | 2,426 | 801 | 33.0 | 1.1 |
| India | 1982 | 2,829 | 131 | 4.6 | 0.7 |
| Indonesia | 1983 | 1,280 | 152 | 11.9 | 0.3 2/ |
| Malaysia | 1983 | 1,796 | 182 | 10.1 | - |
| Nigeria | 1983 | 274 | 30 | 10.9 | 0.3 |
| Philippines | 1982 | - | 101 | - | 0.2 |
| **Developed Countries** | | | | | |
| Canada | 1982 | 50,759 | 1,298 | 2.6 | 1.4 |
| France | 1979 | 23,747 | 1,364 | 5.7 | 1.8 |
| Germany, Fed. | 1981 | 37,001 | 2,084 | 5.6 | 2.5 |
| Italy | 1983 | 28,596 | 1,102 | 3.8 | 1.1 |
| United Kingdom | 1978 | - | 1,545 | - | 2.3 |
| United States | 1983 | 14,777 | 3,111 | 21.1 | 2.7 |
| Japan | 1982 | 60,321 1/ | 4,436 1/ | 7.3 1/ | 2.8 3/ |

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1/ Extrapolated from Unesco Statistical Yearbook (1987)
2/ 1983
3/ 1985

Source: CNPq (1987), Tables V.3-7.

## Annex VI.2

### Brazil: Growth in Graduate Students and Degrees Awarded

| Category | 1975 | 1980 | 1985 |
|---|---|---|---|
| Enrollments | 22,245 | 38,689 | 45,136 |
| Masters | n.a. | 34,570 | 37,985 |
| Doctoral | n.a. | 4,419 | 7,151 |
| Degrees | 2,389 | 4,675 | 4,285 |
| Masters | 2,171 | 4,121 | 3,657 |
| Doctoral | 138 | 554 | 628 |

Source: CNPq (1987), Table I.1

Annex VI.3

## Post-Graduate Enrollments by Field of Study

| Country | School Year Beginning | Total | Educa-tion | Human-ities | Fine Arts | Law | Social Sciences | Commer. & Bus. Adm. | Mass Comm. | Home Econ. | Natural Sciences | Math & Comp. Science | Medical Sciences | Engi-neering | Archit. | Argic. | Not Specified |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Argentina | 1970 | 1,794 | | 197 | | | 282 | | | | | | 411 | | | | 904 |
| Brazil | 1982 | 28,300 | 2,352 | 2,519 | 161 | 1,154 | 5,281 | 1,687 | 81 | 28 | 3,200 | 1,417 | 3,040 | 4,457 | 256 | 2,351 | 326 |
| Chile | 1982 | 1,676 | 202 | 199 | 13 | 239 | 151 | 118 | 25 | 35 | 318 | 62 | 129 | 108 | 20 | 30 | 7 |
| Colombia | 1983 | 8,265 | 1,624 | 284 | 50 | 848 | | 2,793 | | | 415 | | 1,303 | 721 | | 27 | |
| El Salvador | 1983 | 65 | | | | | 22 | 40 | | | | | | 3 | | | |
| Panama | 1983 | 202 | 96 | | | | | 80 | | | | 2 | 24 | | | | |
| Uruguay | 1983 | 18 | | | | | | | | | | | 18 | | | | |

Source: Adapted from Unesco Statistical Yearbook, 1985, Table 3.813
Argentina data come from Cano (1985), p. 150.

## ANNEX VI.4

## BRAZIL

## Growth in Federal Government R&D Expenditures (in millions of constant US dollars)

| Year | Expenditure | Percent Change From Budget |
|---|---|---|
| 1980 | 518.9 | -22 |
| 1981 | 955.1 | +25 |
| 1982 | 1,172.9 | + 4 |
| 1983 | 927.9 | -32 |
| 1984 | 897.6 | + 5 |
| 1985 | 1,220.4 | + 5 |
| 1986* | 1,739.0 | |

*Budgeted not actual expenditures

Source: CNPq (1985), Table II.1

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